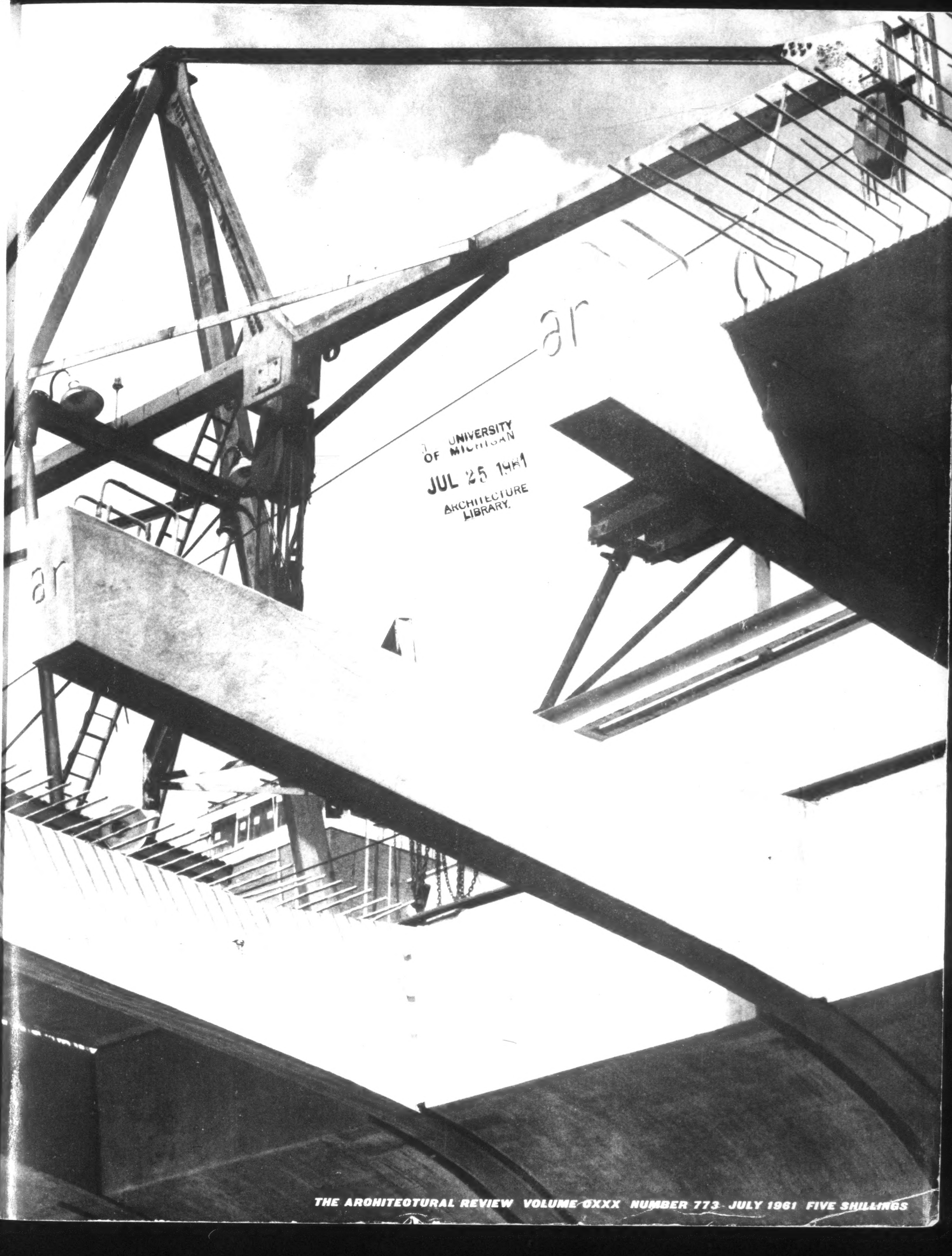

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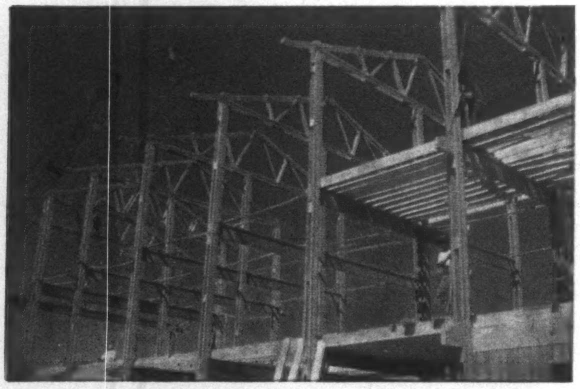

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*The framework for one of the blocks illustrated above is shown in an early stage of erection.

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WORLD

UIA LONDRES 1961

architecture is indivisible. . .

At this time when some two thousand architects from all parts of the world—forty-odd nations will be represented—are gathered in London for the sixth congress of the International Union of Architects, THE ARCHITECTURAL REVIEW re-affirms its international character by offering an enlarged and extended edition of its regular monthly feature WORLD. In addition to its normal service of illustrations and commentary on outstanding new buildings and events, WORLD takes the opportunity this month to explore in greater breadth certain trends and developments in thought and construction, either because they show varying responses in different nations to international problems, or because they embody tendencies which, though specific to a single nation, may yet be expected to exercise international influence in the near future. To accommodate this extended coverage, the pages normally devoted to Views and Reviews have been omitted in this issue.

The internationalism of architecture today is a fact—the world-wide community of techniques, in which the so-called underdeveloped countries are rapidly drawing level with their former teachers, and the increasing availability of even the most advanced materials in all parts of the world, form the basis of a common language of practice and procedure. Treasured national differences of style or emphasis, based upon local needs, patriotism, or the influence of revered teachers, are more clearly defined against this common background, and gain interest thereby in the eyes of other nations. The national magazines of architecture are the servants of this growing international interest, and WORLD takes this opportunity to thank and salute the global network of architectural periodicals that help to keep information moving.

THE MYTH OF TECHNICISM

The Sixth Congress of the IUA meets in London to celebrate—one might almost say *consecrate*—the impact of the newer technologies on architecture. The mood is not that of the nineteen-twenties, when new technologies were held to be not only all-powerful, but all-responsible as well, the creators of a new architecture, and the Machine Aesthetic was the only acceptable style of building among those who held these convictions. Nevertheless, the tone of the Congress is clearly *pro*, and this might therefore be a fit time to remind ourselves that the opposite attitude, or at least a questioning one, is not now restricted to the old and mentally dead.

It is in Italy, in particular, that a group of younger architectural thinkers are expressing grave doubts about any profession of faith in *the machine*, as witness their hostile reaction to the writings of Reyner Banham. Many of these doubts, though gravely expressed, are in fact frivolous, and are simply the 'intellectual' top dressing on Neo-Historicism, but some must command respect and attention. Thus, in *Zodiac 7*, Paolo Portoghesi—who first made his impact on world opinion as a *studioso* of the Baroque, and later as the man who introduced that loaded word *Neoliberty* to the professional press—contributes a long and thoughtful article under the title *Architettura e Ambiente Tecnico*. The title itself may strike non-Italian readers as significant, since it seems to imply architecture *surrounded* by technology, rather than architecture *as part of* technology.

'It is especially important,' he writes, 'to clear up the misunderstandings that have grown up around the notions of technology and progress, for the attempts to establish objective bases for the construction and verification of architectonic language threaten to lead us back, as a reaction against certain aspects of a dominant empiricism, to the old attitude of optimistic confidence in the positive value of any kind of technical progress, and in the possibilities, latent in the adoption of new techniques, for freeing architecture from the quicksand of formalism. . . .' Anglo-Saxon critics of what they take to be Italian withdrawals from modern architecture may be surprised to see that this is how their opinions appear to some articulate Italians, and this, for a start, should serve as a warning against facile optimism in the value of international debate.

Portoghesi's method of 'clearing up' is, justifiably enough, to broaden the ground, and to include within the argument not only technology as such, but a lengthy discussion of 'the problem of human labour' and to draw some parallels between the theories of Rationalist (scil., Functionalist) architecture and those of the rationalizers of labour in the first quarter of this century. (One

[*continued on page 9*

DOMESTIC FRAMES

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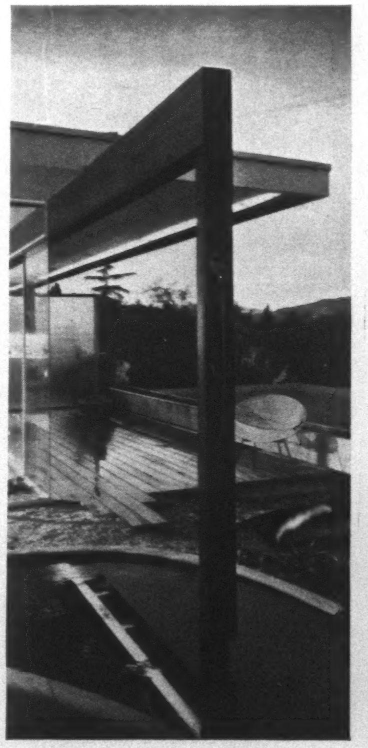
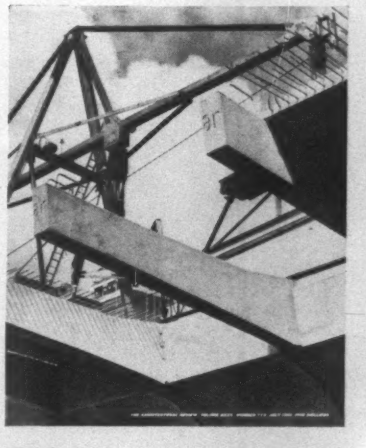


It is noticeable that among German language periodicals, and those under spasmodic German influence, one of the most discussed buildings in the world in the last three or four months has been Richard Neutra's Adler house, and others like it that make great play with space-invading frame structures. *Architektur und Wohnform* picked on another, at Eagle Rock, where the long-stepping frame has its foot, almost inevitably, 1, in a free-form pool, and there is a general feeling of a growing preoccupation with framed houses, at least among the magazine editors, wherever German is spoken. Usually, however, the frame is more regular and stays nearer home—the house on the Starnberger See, 2, by Buddenberg and von Busse, from the same issue of *A & W* is more typical of this German preference, with

2

ACKNOWLEDGMENTS

Cover: Eric de Maré. World, pages 1–9: 1, 2, *Arkitektur und Wohnform*; 3, 4, 7, 8, *Bauen+Wohnen*; 5, Gomez; 10–14, *Techniques & Architecture*; 16–20, *Arhitektura*; 21, 22, Ezra Stoller Associates; 23, 24, Cement and Concrete Associates; 25, *Progressive Architecture*; 28, 29, 31, Louis Checkman; 33–35, Hugo Priivits; 36, Tore Johnson; 41–43, LCC; 44–47, Dariush Borbor; 48, *Werk*; 50, *Apxitektonikh*; 51–53, *l'architecture d'aujourd'hui;* 54, 55, *Bauwelt*; 56–60, Inge Goertz-Bauer. Frontispiece, page 10: Eric de Maré. The Iron Pioneers, pages 14–19: 1, 19, 23, 24, 26, 27, 29–34, Eric de Maré; 2, 5, 11, 13, National Buildings Record; 3, Norman Gold; 4, Helmut Gernsheim; 7, 15, David Wrightson; 10, A. F. Kersting; 12, Toomey Arphot; 14, J. Quentin Hughes; 16, 20, British Railways; 25, Herbert Felton; 28, R. J. M. Sutherland; 35, J. Scheerboom. Flats in St. James's Place, London, pages 20–28: Behr Photography. Exploring Eye, pages 36–42: Eric de Maré. Current Architecture, pages 52–57: 1–5, Henk Snoek; 6, 7, Logan; 8–10, Toomey Arphot; 11, 13, Mann Bros. Miscellany, pages 58–62: Exhibitions, 1, H.M. The Queen; 2, Stearn & Sons; 3, Marlborough Fine Art; 4, Cauvin; 5, 6, New London Gallery; History, 2, National Portrait Gallery. Skill, pages 63–66: 1, 9, 21, Cement and Concrete Association; 2, J. R. Pantlin; 6, Holland & Hannen and Cubitts; 8, Elsam, Mann & Cooper; 10, John Laing & Son; 13, John Maltby; 14, Saga Services; 18, Woodside Studio; 19, British Transport Commission; 22, Colin Westwood. The Industry, pages 68–72: 1, John Maltby; 3, Rylee.



The Cover *shows the projecting beams of precast bridge units, placed by the travelling crane above, on the new Hammersmith flyover. The appearance of the* REVIEW'S *initials on the beam-ends is not an attempt to claim credit and rob the contractors and designers of their due, but re-affirms the* REVIEW'S *belief that new materials and new techniques of this kind are the health and strength of modern architecture. as well as the theme of the Sixth IUA congress which meets in London this month.*

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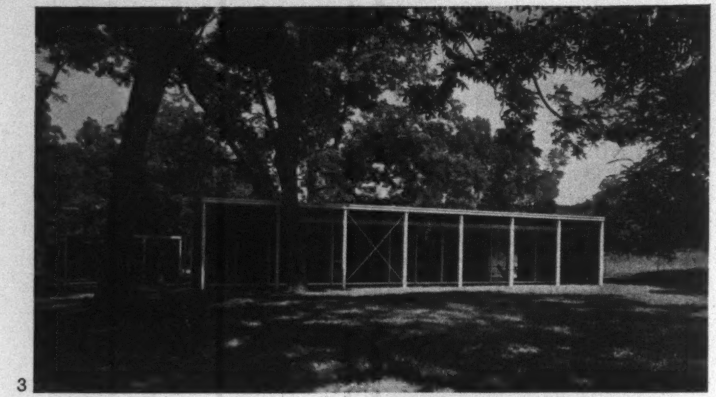
3

Frames

the verticals of its welded-up double-portals (supporting floor and roof) standing just clear of the vertically boarded sidings of the exterior.

But the most extensive anthology of framed-house preferences was in *Bauen und Wohnen*, 1/1960. These included such familiar examples of the genre as the Newberrys' 'Mies-box' in Surrey, but also less familiar examples such as Murray, Jones and Murray's orchard-house, 3, in Tulsa, Oklahoma, with its extremely precise detailing, Friedrich Kramer's rather more involved Sandforth House, 4, in Brunswick; an old friend that has rarely been well illustrated before, Antonio Bonet's open-frame house in Buenos Aires, 5, with its superb patio, 6; Walter Brune's hillside house at Wissembourg, 7; and yet another hillside sample, 8, this time in Liége, designed by Jules Mozin.

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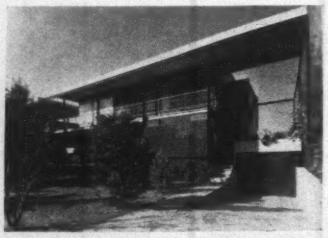
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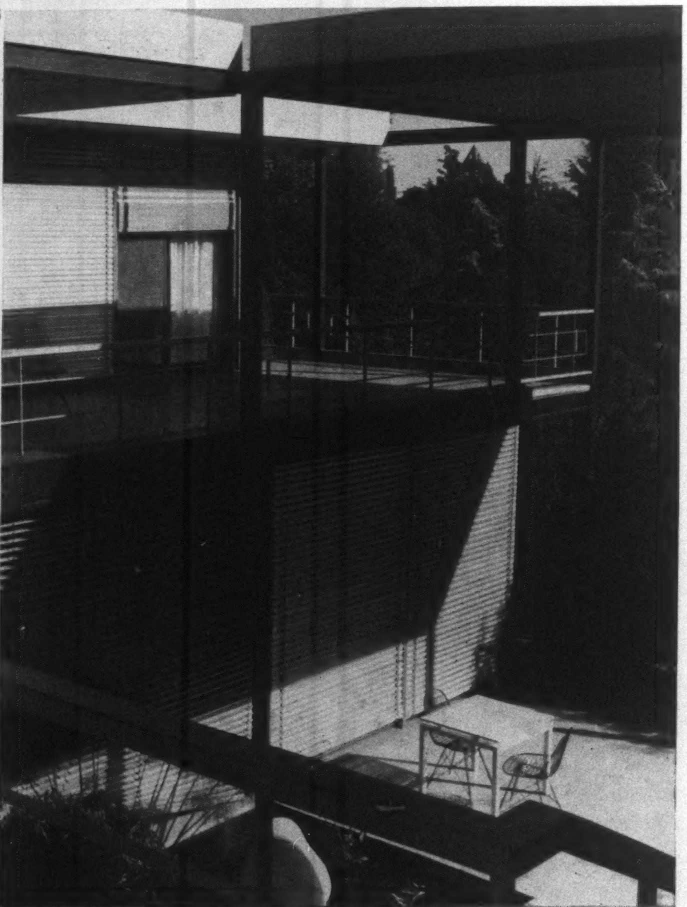

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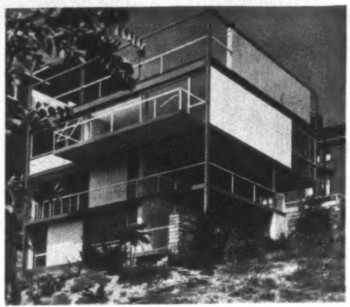
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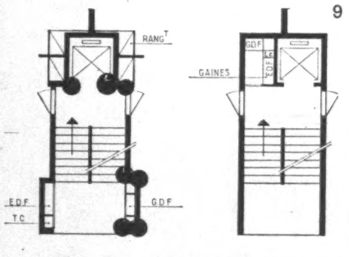
Quite apart from editorial preferences, one quite interesting persistent theme appears in all this work—the division of steel-framed houses, other than Neutra's, into two distinct types to which nearly all approximate. One is the tight, compact, and regular box standing on a fairly flat site, seemingly an obeisance to the classicist authority of a Miesian ideal; the other is an openwork affair, though usually contained in a frame of regular outline, like Mozin's or Bonet's, with hit-and-miss flooring and walling at different levels, built on a sloping or shelving site, and built out of steel simply because it is the best structure on a site where secure footings are difficult to find on a sloping surface.

OTH/BET

research and development in France

The world is becoming aware that behind the façade of politicians, generals and mandarins of the intellect, France has been engineering a major and spectacular industrial renaissance that may yet overshadow the achievements of the *Wunderkinder* beyond the Rhine. An enquiring observer might well ask if something similar was happening behind the scenes of French architecture, since it is clear that while few major talents have emerged to hog the limelight, a great deal of immensely competent architecture is being carried out, with the aid of a building industry that has taken giant strides towards full mechanization and industrialization.

Techniques et Architecture has now afforded its readers a revealing and impressive view of these backstage activities, by way of a special number on OTH, a Bureau d'Etudes Techniques calling itself Omnium Technique d'Habitation and has uncovered in the process a type of Boffinry that Anglo-Saxon countries commonly assume to be specially their own. Effectively, a BET is a permanent association of specialists in various fields of (in this case) building technology who can take over all the preliminary consultant work on a project in one package deal. Having all consultants under one roof in this way not only simplifies the architect's work in assembling his consultants, but also means that the maximum co-ordination exists between the different branches, eliminating overlaps and, frequently, picking up unexpected economies where two or three specialities collide—the *before* and *after* study from the OTH/BET files seen in 9 will make this clear even without defining the contents of the ducts in detail.



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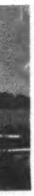
...améliorer la structure sans modifier sensiblement la distribution...

However, the work of the Bureau extends into the field of consultancy in the widest sense, and has made important contributions to constructional techniques such as prefabrication in large elements, rivalling Russian work in this branch, the use of pre-cut stone masonry in standard modular sizes, lightweight frame structures, mixed steel and concrete frames, lightweight cladding, as well as the rationalization of ducts, services and lifts, the building of roads, reservoirs and other outdoor works. As the terms of reference of OTH, like other French organizations, include large areas of north Africa and the Sahara, the work undertaken resembles that of the British BRS Tropical Division in some respects.

But it is in metropolitan France that the full impact and responsibility of the Bureau is most strikingly seen, since it is (or has been) heavily engaged with some of the largest and most notable developments put up in the last few years: Ginsberg's scheme for Meaux, 10, Andre Sive's Firminy-Vert, 11, all but Ionel Schein's tower-block (World, January, 1961) at



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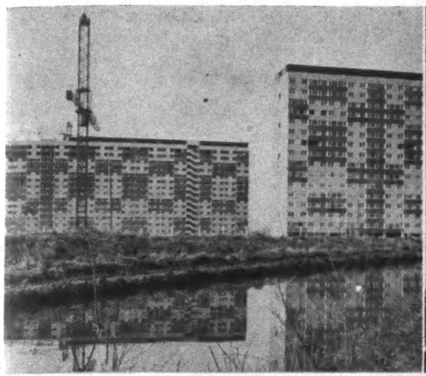

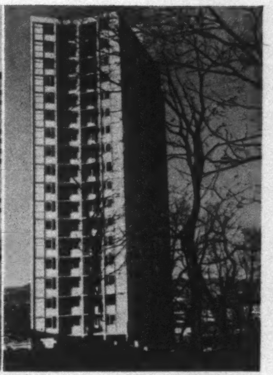

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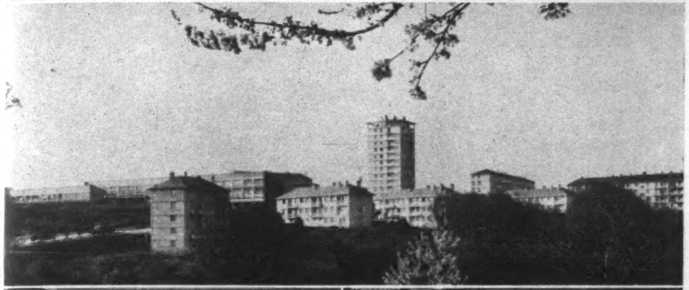

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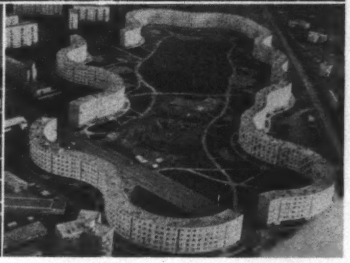

13,14

OTH/BET

Angers Belle-Beille, 12, Egger and Fiedler's scheme for Parc Bellevue at Marseilles, 13, the snake-plan development *Les Courtilieres* at Pantin, 14, and the much-noted star and cylinder blocks at Bobigny by Aillaud and Vedrés, 15.

These are not all, and there are other Bureaux of similar types in the field—the total achievement is impressive by any standards. The obvious question, 'where is all this ingenuity leading?' has already been asked, by Silvano Tentori in *Casabella* (248, 1961) where he justly observes that the almost unplanned application of this facility in prefabrication is destroying French urban life (sparing the whip only from Perret's Le Havre, where a totally integrated design governed by a single modular grid, does at least bring a comprehensible order). The solution does not look as if it will be found simply by adding a few more specialists to the staff of the Bureau—unless they should be politicians.

15

NATELS

tourist building in Yugoslavia

Apart from her own intrinsic attractions for tourists, Yugoslavia's position astride one of the great *routes touristiques* of Volkswagen-Europa (Trieste-Athens) places her in the unusual position of a lightly motorized nation with massive motor-traffic problems in some areas. So acute has the need for effective tourist provision become, that *Architektura* devoted the whole of an issue (4-6, 1960) to these needs. Work is proceeding rapidly on some striking motorway developments, such as the engineer Krunoslav Tonkovic's bridge over the Korana at Slunj, notable not only for its substructure, 16, but also for the almost Roman quality and scale of its approach-works, 17, and their relationship to the landscape.

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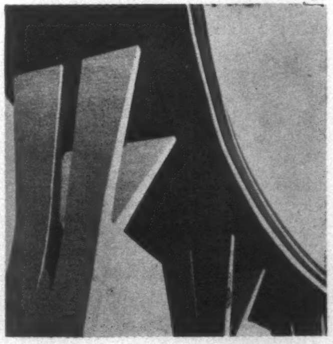

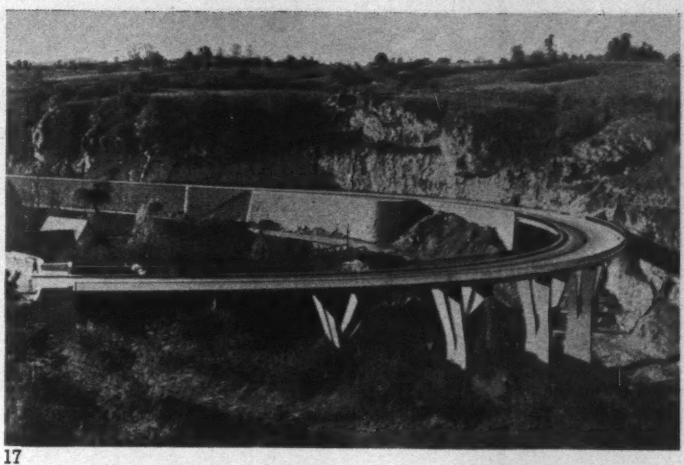

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The landscape problem is as strongly felt in Yugoslavia as it ought to be at Bolsena (AR, April, 1961) and after a strong introduction by Venceslav Richter on the way in which ill-considered tourist facilities can destroy the tourist attractions they are meant to serve, *Architektura* examines a number of specific cases, including that of Lake Borachko, which is directly compatible to the situation at Bolsena. Ivan Taubman proposes zoned use to separate chara-parties from long stay visitors, and avoids suggesting a continuous waterside motorway in favour of a solution that takes traffic well away from the lake.

Nevertheless, tourists will, in general, be encouraged. A remarkable number of new and projected restaurants and hotels are illustrated, some of which make it abundantly clear what sort of tourists will receive this encouragement. The Hotel International, 18, in Zagreb, conforms closely to *Fabulous* norms, although its bedrooms are not big, and its front terrace, 19, follows more closely on Adriatic models than to sweeping motor-approaches of the Air-Conditioned Set. At the other extreme—motorized informality short of camping—are proposed *natels*, a kind of long-stay motel whose creation has been made necessary by (to quote a phrase that needs no translation) 'nove ideje, nove principe i novi tip turisti.' The solution proposed by Branko Petrovic and Branko Vasiljevic is an informal chalet-settlement with separate parking (instead of adjoining parking on the motel pattern) as exemplified in the plan of their project for a natel at Karlobag, 20, where **P** indicates the parking area. Empirical practice has worked out somewhat similar solutions in other tourist areas, but the Yugoslavs have done us all a service in thinking out the proposition from first principles.

HOTEL INTERNATIONAL

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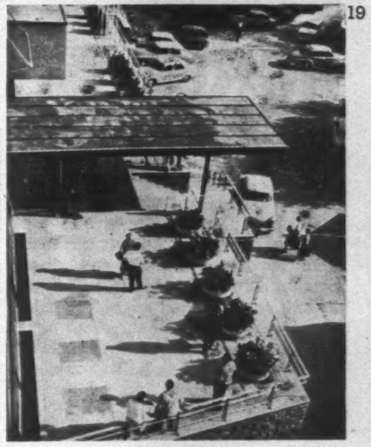

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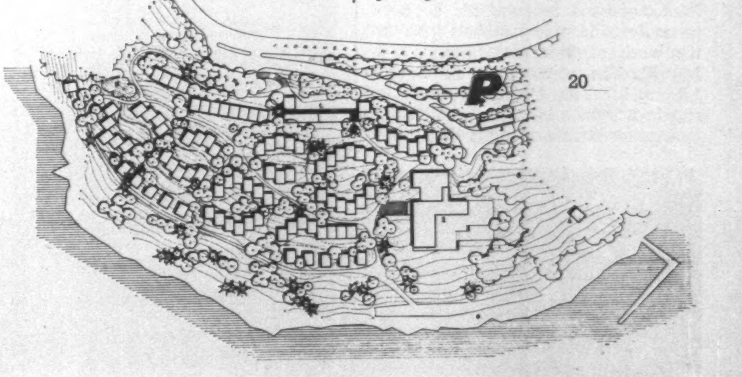

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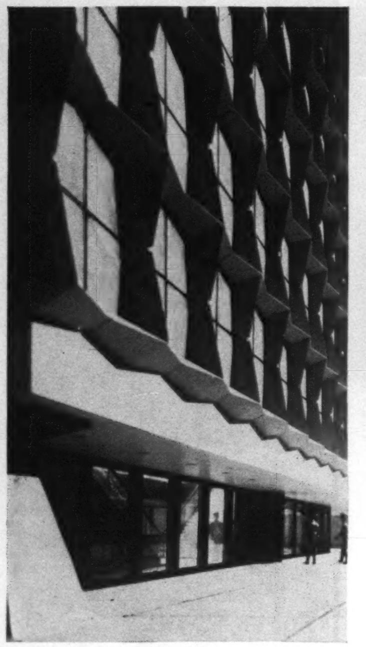

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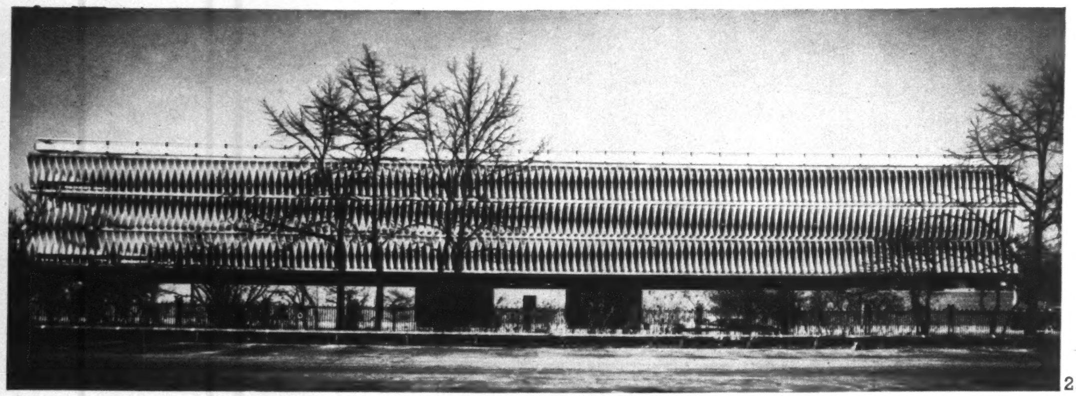

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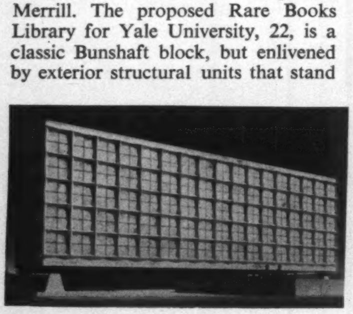
MORE PLASTIC IMAGE

While William Jordy's two articles, on the Formal Image (March, 1960, AR) and on Kahn's Philadelphia Laboratories (February, 1961), each established a *locus classicus* in the criticism of current US architecture, there remains a middle ground of formal structuralism that, though often difficult to evaluate, still needs to be kept in view. Most of the labels that English critics have tried to pin to these trends—e.g. The Ballet School—contain too much implied moral indignation to be much help, and Philip Johnson appears to suspect that even the word 'affluent' as applied to US architecture by Britons contains more disapprobation than description (and he is right, surely). Nevertheless, the middle style exists, and is almost the mainstream of serious US architecture at the moment.

In its simplest form, it is a modification, and little more, of the norms of framed construction, and this, not surprisingly, is how it manifests itself in the work of Skidmore Owings and Merrill. The proposed Rare Books Library for Yale University, 22, is a classic Bunshaft block, but enlivened by exterior structural units that stand proud of the grey onyx 'glazing,' 21, in such a way as to produce sculptural effects close to textural at a distance. Something similar clearly applies also to Albert Kahn and Associates' parking garage, 23, for the Henry Ford Hospital in Detroit, where the warped concrete sun-shade elements become a texture within the total block, but have a strong sculptural quality of their own at close range, 24.



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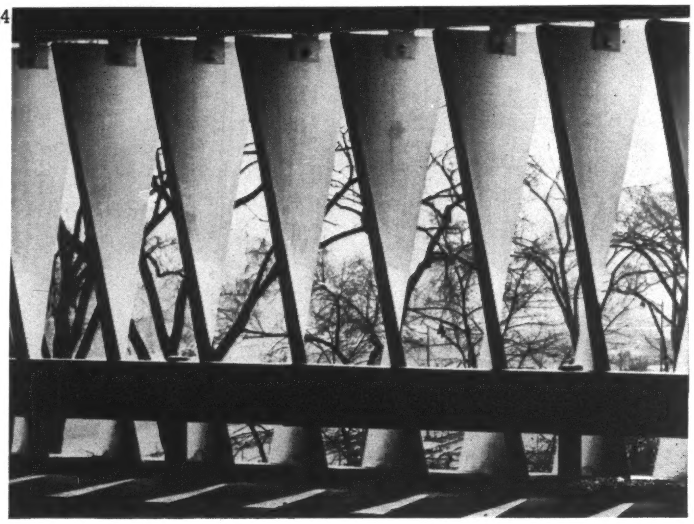

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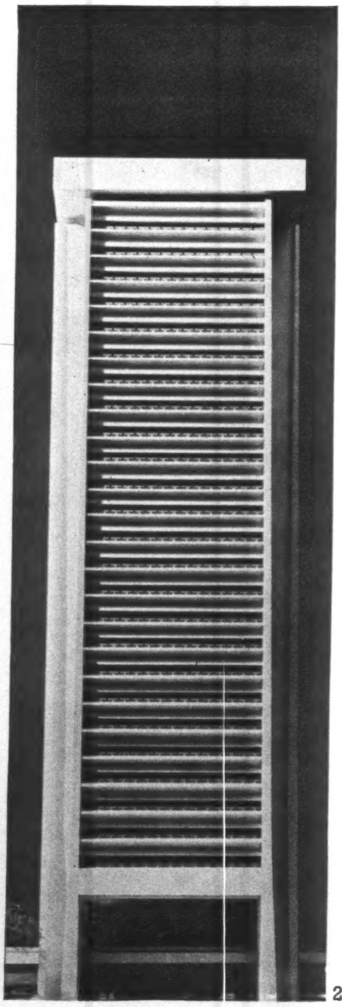
After this, the going becomes more difficult: I. M. Pei's recent work affords examples. His concrete housing blocks (following on, in a sense, from the Denver Hilton, AR Oct., 1960) at Hyde Park, Chicago, and Kips Bay, New York continue the texture/structure approach, but his project for the MetropolitanTower, 25, in Honolulu, is a different proposition. Here the structure proper, the huge, re-entrant corner stanchions (see plans, 26) make a strongly sculptural statement, but the modelling of the balcony/edge-beams at each floor level is so powerful and so large, 27, that these units can hardly be considered as visually subordinate, even though they are a secondary structural system.



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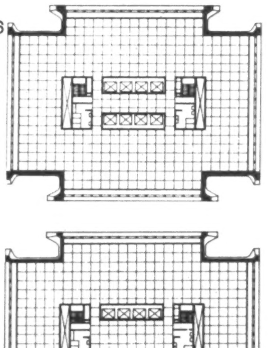
This may be regarded as an intermediate stage towards the total sculptural structure, most directly exemplified in recent projects by Philip Johnson. The precise architectonic meaning of some of these structures, however, seems ambiguous. The portico of the Brown University Computing Centre seems to be just that, 28, a *portico*, uninvolved with the struc-



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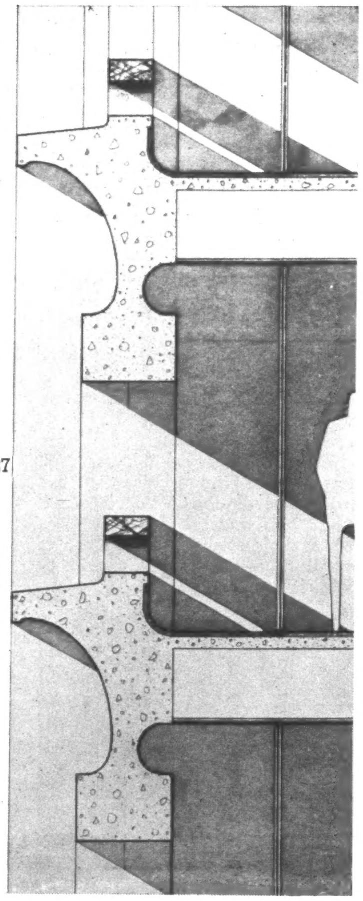

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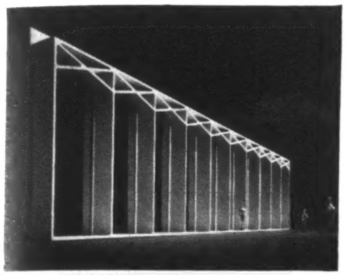

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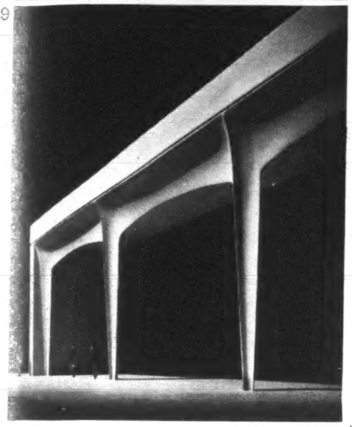
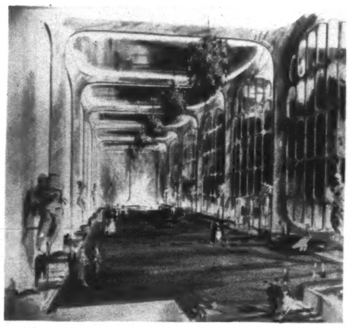


29

US plastic

ture behind; the 'stoa' (the term seems proper) of his Amon Carter Museum at Fort Worth, 29, has retired under the main roof of the building, and is thus more involved with the general structure, but complete integration of the sculptural forms with the main structure only really begins with the exterior and foyers, 30 and 31, of his Lincoln Centre Dance Theatre. Whether or not the sculpture-structure extends into the theatre proper or not (this yet remains to be seen) it definitely includes the entire foyer space, as 30 shows, and thus becomes a full and respectable architectural system.



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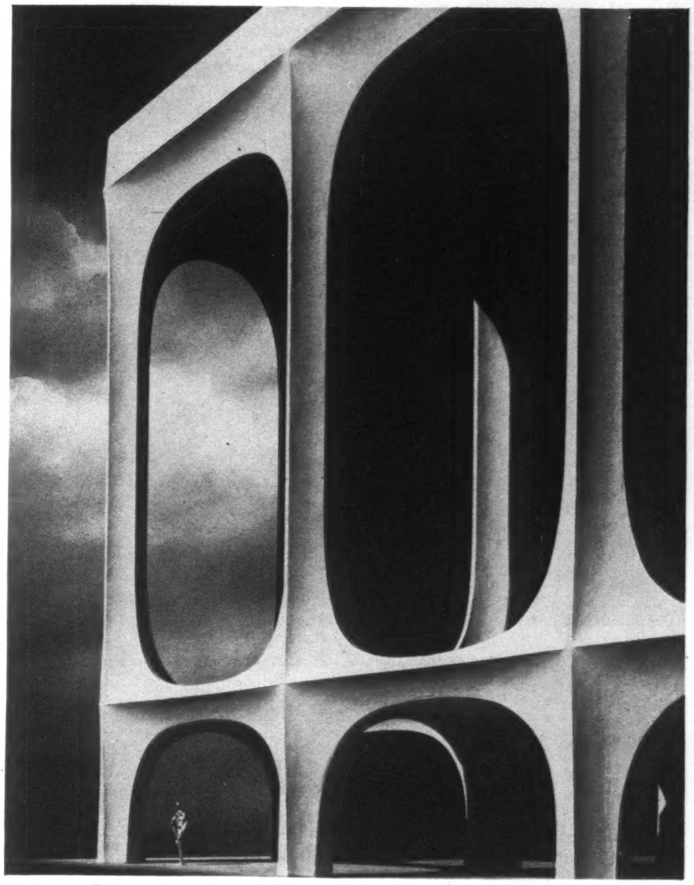
Beyond this? Perhaps Paul Rudolph's gigantic parking garage now under construction in New Haven, 32, does represent another step, since the structural system implicit in the storey-high sculptured forms of the exterior genuinely extends right through the whole building and comes out the other side. Internally the system will need some modifications—this is obvious—and it will be interesting to see if these will effectively negate, or confirm, the visual continuity of the system, but this is something that only direct physical experience of the completed work will tell.

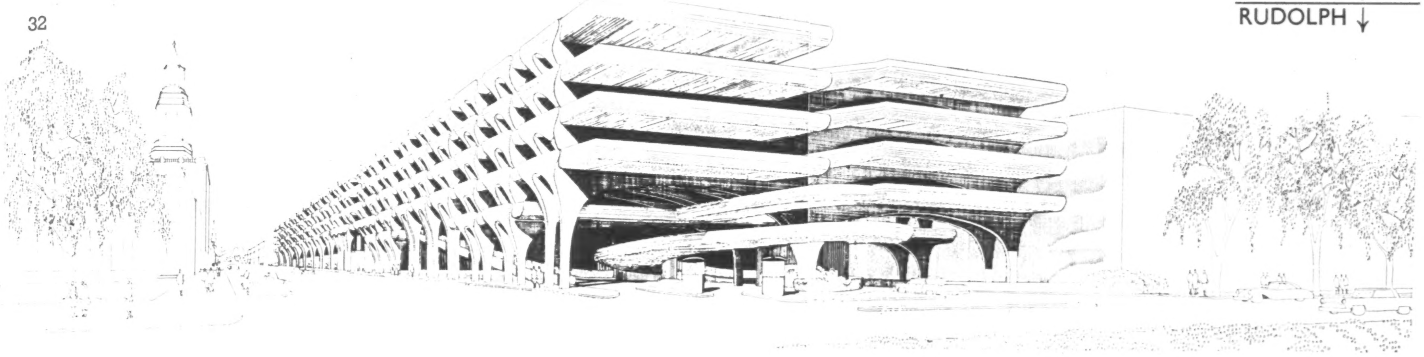


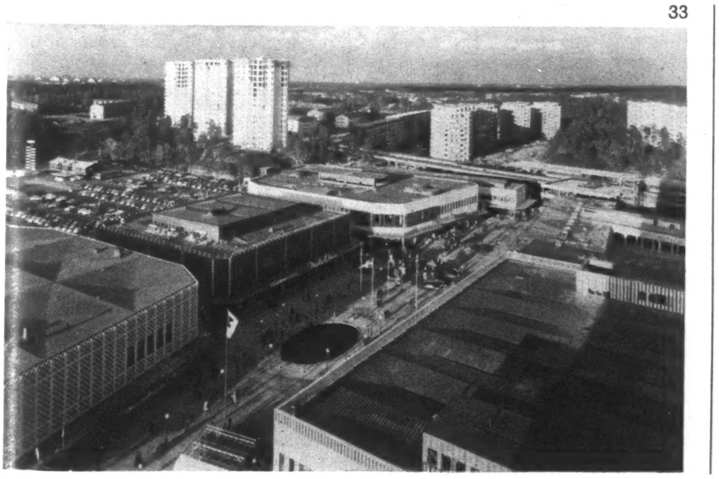
31

JOHNSON ↑

RUDOLPH ↓

32





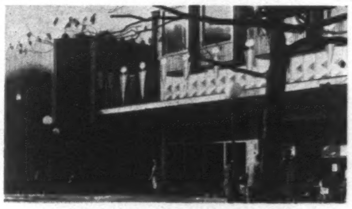
33

Farsta

Swedish New Town Programme

After Vällingby, Farsta; after Farsta, Täby—Stockholm will soon have as many residential satellites as Old Earth has Sputniks and Explorers. Täby is still a project, but scheduled for completion as early as 1968, at an expenditure of 300 million Kröner, its main centre to be dominated by a 22-storey slab block curved round in a semicircle. Whether this drastic formal element has long been in mind is not clear; one wonders if it might be a reaction against Farsta centre now that it can be seen, for Farsta, 33, takes even further the Vällingby concept of the centre as an aggregation of large, low blocks, and the result has been criticized. But is the criticism well placed? May not the trouble, the cause of the disappointment over Farsta, be the way in which the constituent blocks of the centre have been prettied-up, 34, with dimpled panels, Ed Stone screens

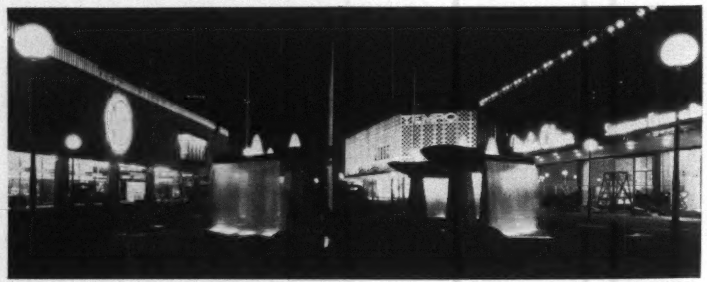
34



Sweden

and dagged parapets. The enclosed space is, detailing aside, better than at Vällingby Centre simply because it is more effectively enclosed, a fact which appears more clearly in night shots, when the decorative surfaces are played down, and the remarkable fountains, 35, are played up. All the same, one cannot help feeling that this shopping centre might have profited by something like Stockholm's new PUB store, 36. in which the architects Erik and Tore Ahlsen have produced—with complete and singular success—a reversion to a glass-box dream that has almost been forgotten in recent department-store design.

Criticisms aside, however, the mere existence of Farsta so soon after Vällingby, and the accumulated body of experience-in-progress that this must represent, promises well for Täby, and adds up to a dynamic town-building tradition unique in the Western World. Visionaries may descry, and statisticians may count, but Swedish architects will soon be able to present themselves to the practical men and politicians of the world as *those who know*.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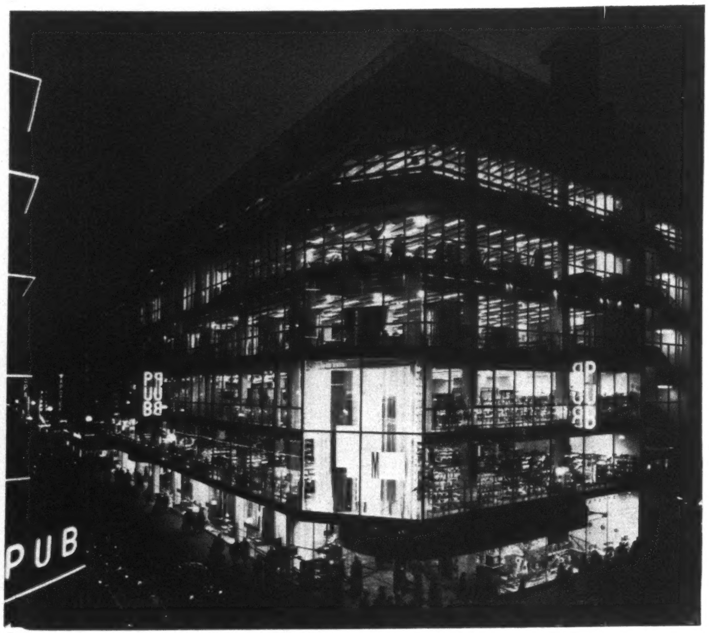
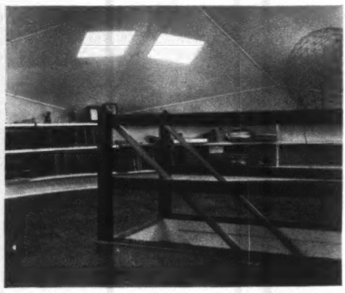


36

HOME DOME

An architect who lives in his own designs is as rare as a prophet with honour in his own country: Buckminster Fuller is now both. His acceptance as a major sage is well known, his house is not. As a residence for his periods as research professor at Southern Illinois University, Carbondale, Ill., he has built himself an example of the first type of dome, 37, to actually reach the market as a small home, in which geodesic geometry is realized in the plywood and battens of simple, largely nailed-up structure, marketed (and largely equipped) by the Pease Company, who also manufacture old-fashioned 'square' prefabricated houses.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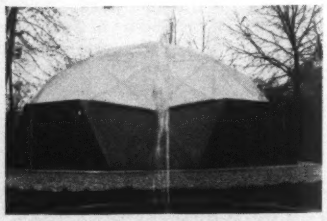
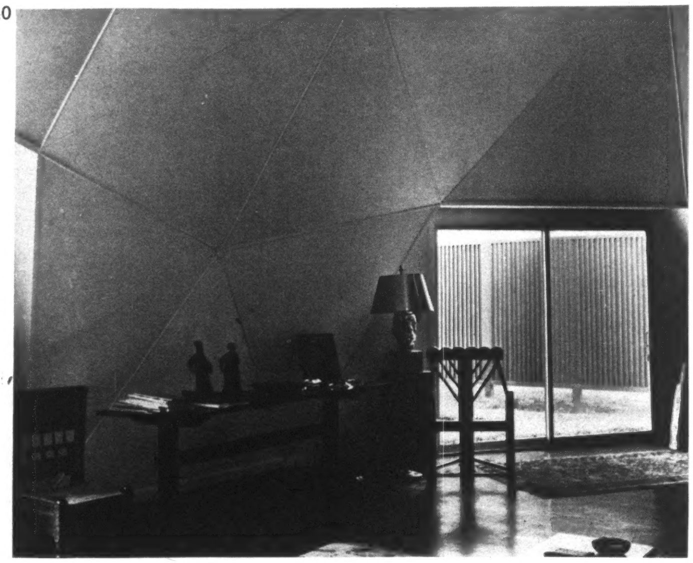

37

Internally, this faceted near-hemisphere is half-floored, 38, with the bedrooms under the deck, and a kind of library-loft on top of it, the rest of the ground floor then becomes a double-height living-room occupying more than one third of the thirty-five foot diameter circle. As befits an elementary nailed wooden structure the detailing has a direct functional-tradition simplicity (as in the hand-rail and posts in 39) and it must, presumably, be this directness of approach that accounts for the complete congruity with which the Fuller collection of early New England furniture and Oriental antiquities, 40, settles into an interior that is, in some ways, rather too modern for the Eames chairs round the dining table.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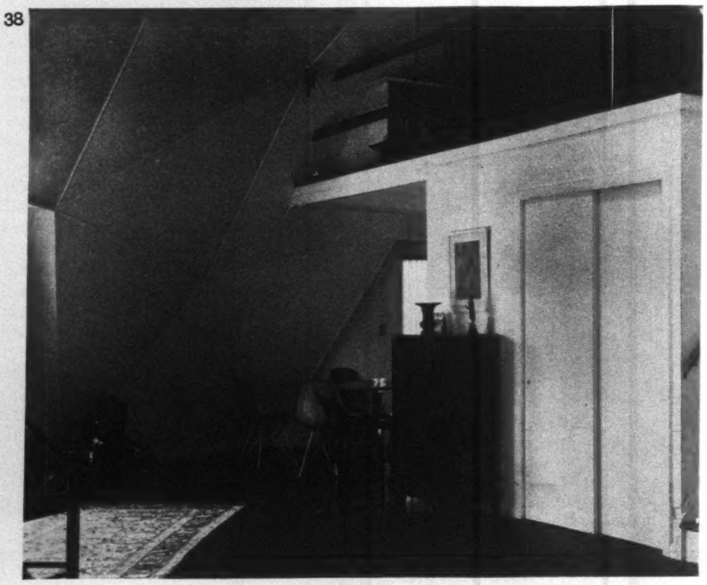
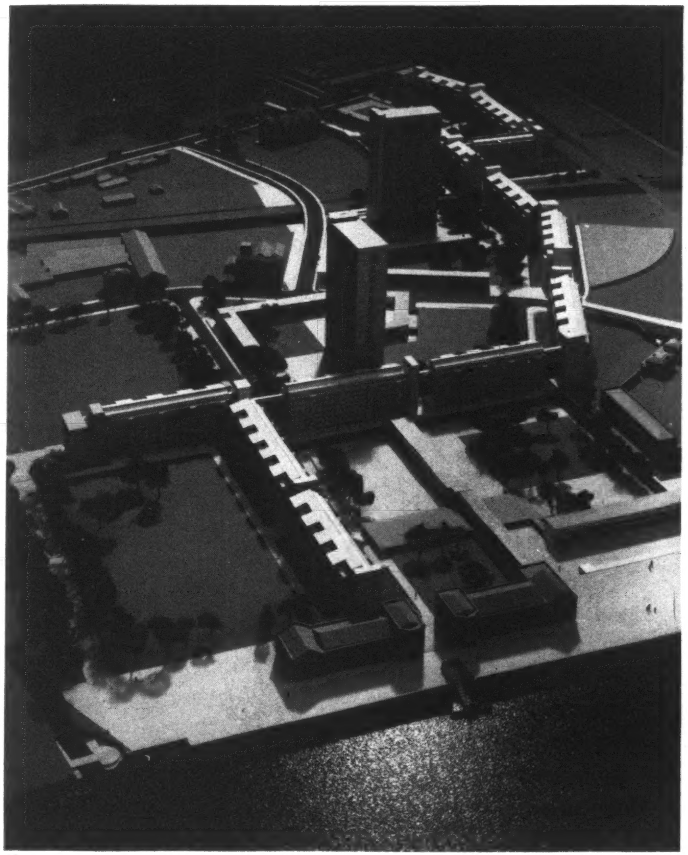

38

LCC MOVES IN

approach to central area redevelopment

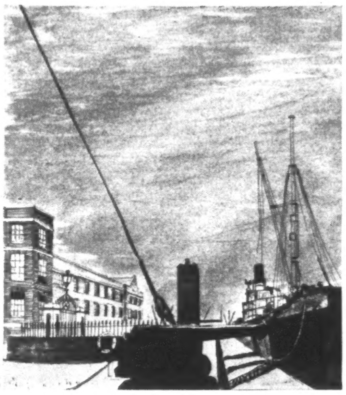
The London County Council's impressive international reputation for well-designed housing has depended so far on developments—such as the Alton Estates at Roehampton—on the periphery of the metropolitan area. But attention has now perforce to turn inwards, to what are, in effect, urban renewal projects on sites that offer few of the natural landscape advantages of the suburbs, and may contain land or buildings of historic interest. The most consequential of these internal developments to be undertaken so far is the Deptford scheme, 41, announced in April,



41

Deptford

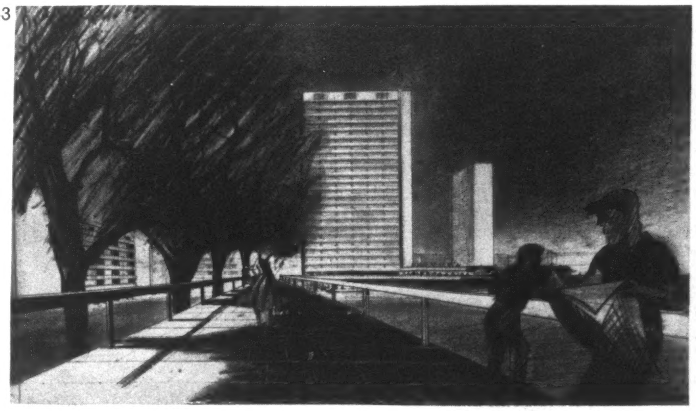
which involves the site and remaining buildings of the Royal Victoria Dockyard, associated with the British Navy as long as such a service has effectively existed. Former naval warehouses are seen on the riverside in 41, and it is intended to retain and enhance the naval character of the quayside, 42, which will now, however, become a public open space, thus giving the inhabitants of the district access to the river for the first time for over a century.



42

Behind this, a long line of split level apartment blocks will run back inland as far as an existing open space, Deptford Park, providing the continuous architectonic link required to hold the diverse elements of the design (tower-blocks, terraces, etc.) in a comprehensible composition. Even so, the unity of the scheme clearly needs further definition, particularly in terms of circulation (since it is broken across by roads and a canal) and this should be materially assisted by the raised walkways which will connect the various parts of the site, 43, and provide, so to speak, a continuous viewing platform from which its serial continuity may be appreciated.

43

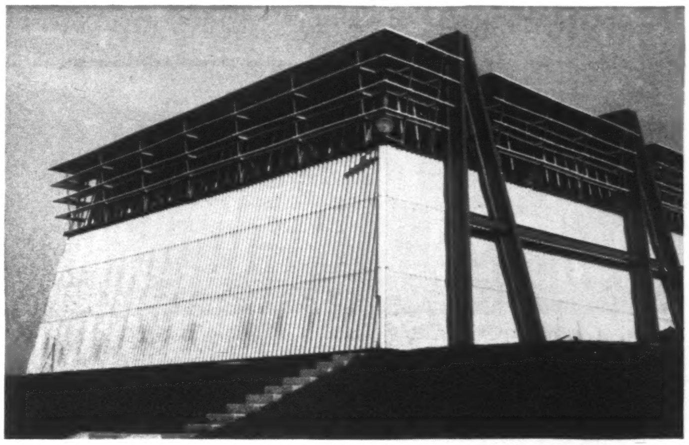


cern

European atomic research centre

As international a piece of architecture as one could want, heavily involved with the most forward of contemporary technologies, is the research centre for CERN in Geneva. The research wing of Euratom (in effect, if not in strict legal terms) the Commission Européenne pour la Recherche Nucléaire commands extensive plant designed by Rudolf and Peter Stieger (engineers, Fietz and Hauri) over the last seven years. The work is inevitably various in function and form, including a power-station, 44, with a type of external steel structure that re-appears on other buildings, such as the Synchro-Cyclotron, and separate linear-accelerator building, 45; a neat office block which does not really reveal its polygonal deviations from planning norms until its end elevation, 46, is seen, and a small auditorium, 47, which is part of the same building-complex and follows the same 20/70° deviations which here make more obvious sense in view of the advantages of a polygonal plan for a lecture hall.

44



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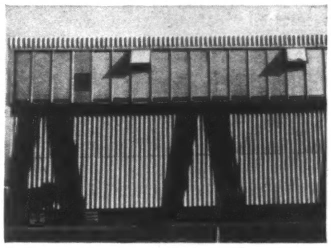

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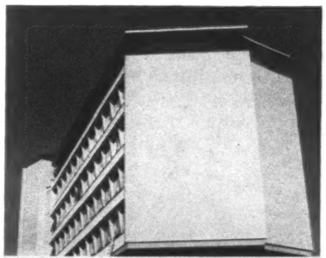

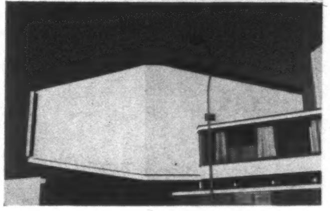

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One may be permitted to wonder at this angular irregularity: it does little to enhance freedom or adaptability of planning since it is linked to an axial, symmetrical concept that has already had to be overridden in places out of sheer necessity. One almost suspects that the angles express frustration that the really important installation, the enormous ring of the proton-synchroton accelerator, cannot be expressed architecturally since it is almost entirely buried in the earth (for obvious reasons) and only surfaces in one small, though striking, monitor-roofed building, 48. Be all this as it may, CERN remains one of the few significant international organizations of the post-war epoch whose buildings raise no major disquiets as to either the way they serve their functions or the attitudes they appear to express.

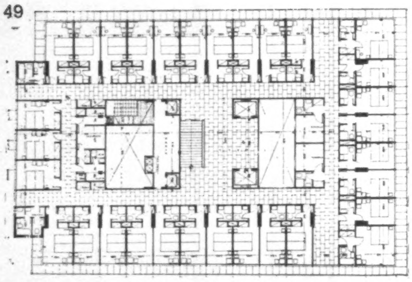
48

HOTEL IN OMONIA SQUARE

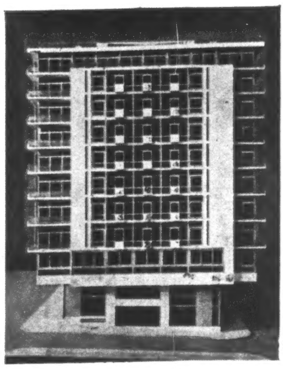
Most international of building types, carrying almost universal standards of accommodation to all parts of the world including some of the Socialist Republics, the modern hotel is an epitome of the (affluent) human condition in the age of new materials and new techniques. There is an almost unbeatable formula for economical hotel-planning, which was set out by Stephen Garrett in the AR's special issue on hotels (October, 1960), where

Hotel

49



he also considered the structural implications of the bedroom/bathroom /duct configuration. A text-book solution is seen in the standard floor-plan, 49, of Anthony Kitsikis's project for an hotel on Omonia Square, Athens. Since this is a class III hotel, rather than an Hotel Fabulous, the planning is compressed, which gives even greater saliency to the economy of the standard floor-plan. In accordance with the other economic laws affecting hotels, there is a cinema in the basement, with one-and-a-half floors of shops around the public areas, but where the pressure of economics brings about a transformation of routine solutions is in the relationship of the lettable room-space to the rented ground-space—the hotel covers not only its own site, but the surrounding pavements as well. The plan should have prepared one for this, but the elevation as it appears in *Architectoniks* (1/25, 1961), still comes as a shock, 50, when it is seen that *all* the bedroom space, with very minor reservations, is cantilevered beyond the limits of the site. The mind boggles at town-planning regulations that can permit such overbuilding, but one must also admire an architect who so ingeniously proposes to take advantage of them.



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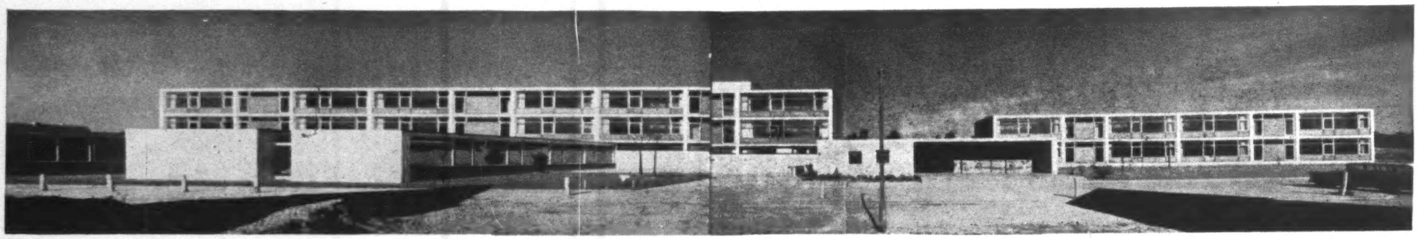


51

NEW GERMAN SCHOOLS

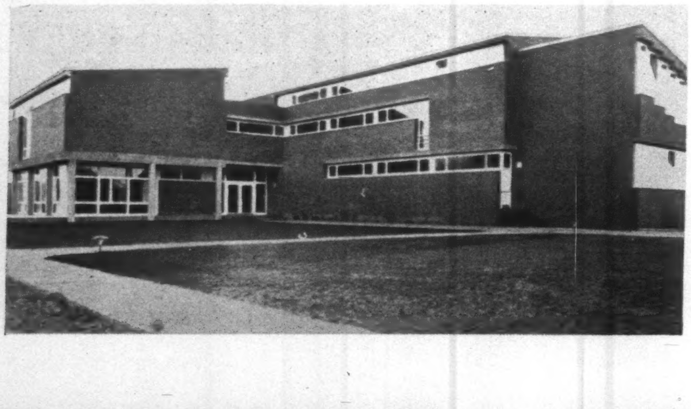
Understandably, interest in German school-building has been somewhat monopolized by the work-in-progress of Hans Scharoun (*World*, December, 1960) and misgivings about imported prefabricated systems—misgivings reinforced by the appearance of a Dutch wood-framed system which is already in use under licence. But there is much more to the situation than this, obviously, and German school design should command wider international attention from both pedagogues and architects.

In fact, such interest is becoming apparent, at least among architects, for *Architecture d'Aujourd'hui* has recently (94, 1961) published a group that includes not only Scharoun's work, but also Dieter Oesterlen's community school in Hanover, 51, pure diagrammatic International Style, but uncommonly fresh and relaxed for an idiom that tends to look tired or overwrought today. *AA* also illustrated a large teaching institute in Oberhausen, whose Dudok-style exteriors unmistakably reveal the hand of Oswald Mathias Ungers, 52, but suspicions of period-revivalism should not be allowed to divert attention from the ingenious cluster-planning of the teaching areas where Ungers's highly characteristic style of design achieves a comfortable middle pitch and domestic scale. Ironically, another of *AA's* selected examples, the Eberhard Ludwig school in Stuttgart by Bregler, Bregler and Huber, is perhaps the best known modern school in Germany for entirely non-architectural reasons—readers may recognize its main elevation, 53, from its frequent appearances in the film *So Lange das Hertz schlägt* which has been widely shown outside Germany.

German magazines, obviously, have carried plenty of information on school architecture, but some of the most informative—such as *Bauwelt*—are not as widely read outside the country as they deserve. In February (7, 1961) *Bauwelt* had almost a special number on schools, including (inevitably) one Scharoun, and two others that illustrate two current extremes in German architecture. One, at Oberaden in Westphalia, by Ludwig Behrens and P. G. Wieschemann, had the leaning elevations, 54, the mildly anti-formal plan and the lavish use of integrated art-work that all belong to the more romantic strain. The other, at Grosskrotzenburg, adheres so squarely to more-or-less Max Bill version of the International Style, 55, that one is astonished to find that its architects, Novotny and Mahner, designed it as recently as 1959.

At least one uncommonly interesting school in Germany seems to have escaped the notice of the magazines so far—possibly because its most interesting aspects are not immediately apparent to exterior view, 56. This is a compact primary school in Ober-

52



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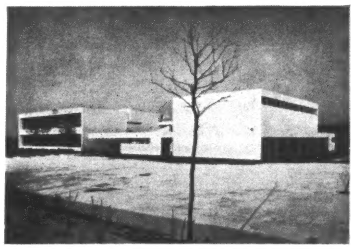

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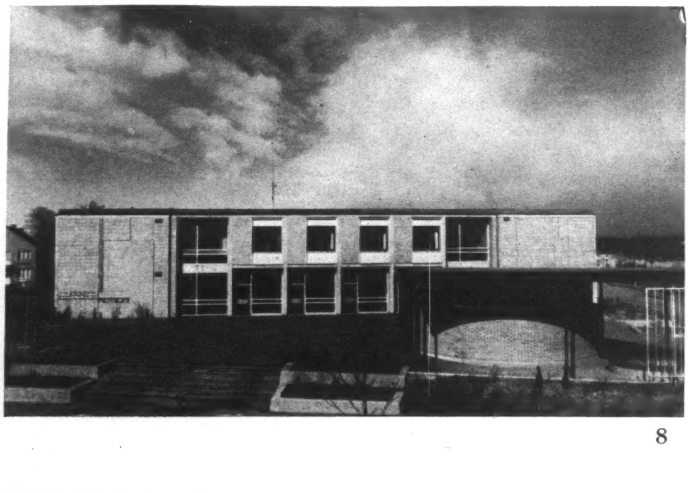
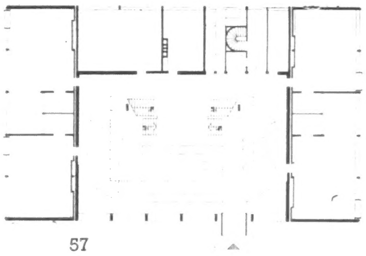


56

hausen, designed by the Duisburg architect Lothar Kallmeyer, for an area liable to mining subsidence. The local solution to differential settlement is not, as in England to use a flexible frame (e.g. CLASP construction), but to break the structure into independent units each with its own foundations—the plan, 57, clearly shows how the two flanking class-room blocks stand clear of the central block containing the hall, and the completely separate cloak-room building (such fastidious banishment of sanitary areas is a German practice—the lavatory-in-class-room planning of recent English schools has raised many German eyebrows).

The necessary separation of parts justifies some differentiation of structure, and the outside walls of the class-room blocks, 58, are built of precast *Schockbeton* units (in the absence, again, of a native lightweight prefabrication system). However, it will be seen in 56 that the return walls of these blocks have an elaborately treated brickwork pattern on them, and this is, in fact, part of a continuous brick-sculpture wall, devised by Werner Habig, which unites the diverse elements of the structure by covering the end-walls of the class-rooms, and then, turning inside the main hall, 59, wraps round the interior space as well, 60. One other point to note about this brick sculpture—since the actual making of it counts as bricklayers' time, the entire percentage of the budget allocated to 'art' can be turned over to the artist's fee, one of the most compelling arguments for the integration of the arts yet discovered.



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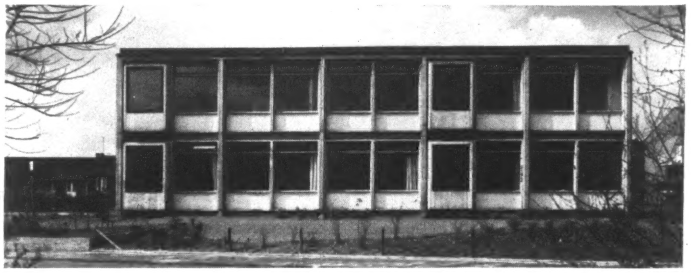


58

59

60

Technicism

continued from page 1]

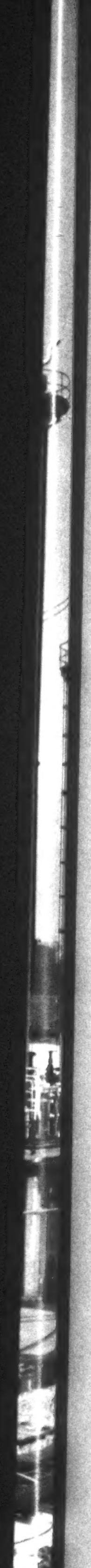
wonders why he does not draw attention to Le Corbusier's frequent use of *Taylorisation* in that period as a term of praise) From this, however, we proceed naturally enough to a condemnation of the Masters of the Twenties (in all the arts) for failing to establish contact with the working classes even while idealizing the concept of the working class; and from this again we proceed naturally to the 'alienation' of biological man from the industrialized man of increasingly rationalized production processes (covering ground which will not be altogether unfamiliar to readers of the arguments of American critics like Paul Goodman).

Beyond this we come, inevitably again, to the crisis of leisure and redundancy anticipated with the onset of full automation, and the sinister possibilities of 'programming' human beings to work even more efficiently and undemandingly than machines. But here, in spite of warnings against optimism, a note of hope enters the argument — automation, properly handled and properly planned, could free men for more creative activities than the routine of production, could even *demand* such creative work from them. The function of architecture will be to give order, the function of the arts generally will be to 'offer the man of our time (whom—to quote Gropius—the great avalanche of progress and science has left uncivilized and restless, incapable of adaptation and often pitifully lacking in moral initiative) an image of himself striving to recover the sense of being rooted in his society and environment.'

There then follows a concise and minatory history of fifteen years of confusion in Italy, faced with this situation since the war, and sharp criticism of those of his fellow countrymen who treated attacks from abroad not as occasions for serious self-appraisal but for factional recriminations and the search for scape-goats and 'In this climate of opinion the myth of technicism has again risen as an escape into objectivity.' This phrase, which seems so extraordinary to non-Italians, of the *escape into objectivity* (rifugio nel oggettivita) touches an idea which, while it appears at first sight fairly ridiculous, has some currency in Italian architectural thinking of this persuasion (Tentori has cited Italo Calvino on the dangers of 'drowning in a sea of objectivity,' see *World*, June 1961) but deserves sympathy because it stands for a concept which is, in the last analysis, dear to the hearts of all architects—the supremacy of concept over fact, the ordering power of the mind.

But is the *myth of technicism* really open to such an interpretation—at one extreme it is a far from objective concept, involved with dreams that have nourished the imaginations of generations of the greatest creative minds the West has produced, and at the other extreme, the most optimistic of the technological optimists would probably agree with Portoghesi wholeheartedly. Buckminster Fuller, by whose standards the buildings of the Milanese Neoneoists are irrelevant to the human situation, has always insisted that the mental process is primary, that thought is comprehensive to the universe of facts. The real conflict of opinion, one suspects, lies with Portoghesi's concept of 'being rooted in his society and environment.' Fuller's man 'in principle mobile, born with legs not roots,' is self-sufficient with his own resources, and reliant on his own ingenious capacity to dominate his environment.

Such an attitude, Portoghesi would probably (and many of his Italian contemporaries would certainly) dismiss as old-fashioned, counter-insisting that 'we should not idolize novelty, nor forget that it is the principle of rest that gives values and sense to movement. . . . Italian architectonic culture must not evade its responsibilities, which consist not only in renewing and purifying itself, but also in its historical heritage,' and he concludes with a moving passage from Simone Weill, on the value of that heritage. 'Of all the needs of the human spirit, nothing is more vital than the past.'



On page 36 of this issue Eric de Maré, who took the photograph opposite, discusses the aesthetic qualties of modern industrial structures of this kind by way of introduction to some more examples of what he calls the modern version of the Functional Tradition in the oil and steel industries. His pictures may also be regarded as illustrating one aspect of the theme of the current IUA congress—the impact on architecture of new techniques and materials—to which several articles in this issue relate. The subject of the example opposite is a solvents distillation unit (with an ethone ethylene unit in the background) at Stanlow. The photograph is reproduced by permission of the Shell Chemical Company.

C. H. Waddington

TOWARDS A SCIENTIFIC WORLD

This essay has been written, for the occasion of the sixth congress of the International Union of Architects, which takes place this month in London, by Professor C. H. Waddington, F.R.S., *of the University of Edinburgh, biologist, head of the Institute of Animal Genetics and author, among other things, of a famous Pelican,* The Scientific Attitude. *Since the theme of the congress is new materials and techniques, the whole relationship between the world of architecture and the world of science will in effect be under discussion. Whether acknowledged or not, the aim of the congress must be to bring one step nearer that truly scientific civilization to which this essay looks forward.*

We are often said to live nowadays in a world of science, but it isn't really true. Of course the material background against which we play out our lives has been profoundly influenced by an industrial technology founded on science, but there are two reasons why this in itself is not sufficient to allow us to feel that our world is a scientific one. In the first place, the purposes for which the technology is used have not been decided by men with a scientific outlook, but by industrialists and statesmen whose personality has been, in the main, formed in the mould of a pre-scientific culture. The use of atomic energy mainly for the development of weapons is only the most recent and glaring example of the way in which this has led to the diversion of scientific methods to the service of objectives which do not fit into the scientific world picture.

The second, and perhaps more profound, reason why we cannot claim that our world is a scientific one is perhaps to a greater extent the fault—or at least the inadequacy—of science itself. We have not had, and indeed are only just beginning to come in sight of, a scientific conception of man himself. In most past ages of civilization the stage on which man passed his life was designed for him by people who had a rather definite conception—perhaps often an unconscious one—of the kind of being who would inhabit the houses, streets and cities which were being built. Gothic architecture was created for man as he was seen by St. Augustine and the Medieval Church;

Renaissance Italy for Benvenuto Cellini and the de Medicis; Venice for those who have been portrayed for us by Titian and Tintoretto; Versailles for the nymphs and gallants of Boucher; the urban landscapes of Holland for the men and women of Rembrandt and Franz Hals. But what manner of man is envisaged as living in the buildings of Mies van der Rohe or Le Corbusier? We cannot have a scientific world, in the sense that there was once a Gothic or a Renaissance world, until we have formed the concept of a 'scientific man.' And, granted the character of science, this conception will almost certainly have to be much more consciously and definitely formulated than were the images of man which provided the focus for past phases of civilization.

Where is such an image to be found for the present day? Science developed in the first place by attention to the relatively easy material offered for its inspection by the non-living world; and physics and chemistry are still the basis of the most important technological changes which have been made in the circumstances of man's life. Biology, with the development of the revolutionary advances in medicine and agriculture of this century, is at last beginning to play an equally important role. But man himself is incomparably the most complicated subject matter for science, and it is only very gradually that the human sciences—such as Psychology, Sociology, Anthropology, etc.—are beginning to form a picture of his nature which is anything more complete and inclusive than a set of isolated penetrating glimpses.

To see man as a whole we can scarcely yet do more than go back to the pre-scientific images presented to us by writers such as Jane Austen, Stendhal and Dostoievsky. The basic reason for the famous gap between the 'Two Cultures,' to which Sir Charles Snow drew attention, is that the scientific culture itself is incomplete, and incomplete in the most damaging possible way—in lacking a focus, a concept of the essential nature of man as a complete being. Perhaps the elements in terms which such a conception will eventually be framed have already appeared, or are beginning to appear, with the development of the human sciences, but they are still hidden within the professional literature, and have as yet had little effect on the work of the artists and architects who create the world we live in.

Science in general has, of course, had a profound effect on the development of art during the last century. This was perhaps first strongly noticeable in the somewhat superficial influence of a scientific technique—photography, and particularly snapshot photography—on the composition, and to some extent the subject matter, of a painter such as Degas. And scientific theories of light and colour played an obvious and acknowledged part in the work of the Impressionists and Pointillists. It was, however, not till the beginning of the Heroic Age of modern art—the two decades from 1910 to 1930—that one can see in the work of artists a real engagement with the spirit rather than with the externals of science. The main roots of Cubism—the first major modern movement—should perhaps be looked for not within science but in the recognition of the numinous quality of non-representational works, as seen for instance in Negro sculpture. But the forms it adopted, mainly of intersecting plane surfaces, can scarcely be considered as other than a reflection of the scientific world of crystals and geometry; while the simultaneous presentation of a form as seen from different viewpoints in space or time (Picasso, Duchamp, the Futurists) must certainly have some connection—if only through the tenuous agency of a Zeitgeist—with the contemporary development of the theory of relativity. In the development of Analytical Cubism to Synthetic Cubism, and then to Constructivism, it was the strand of interest based on the aesthetic quality of abstract forms—at first mostly of a geometrical (i.e. scientific) character—that was carried forward; the aspects of the scientific world picture related to the theory of relativity dropped into the background.

The next major scientific influence on the visual arts came from right the other end of the scientific spectrum. The artistic beginning of this movement, Dada, again arose not from science but from the world of life in general, as a movement of Nihilism and despair following the 1914–18 War. But again, it could not have taken the form it did in Surrealism were it not for a movement of thought which one is, I think, justified in calling scientific, namely Psycho-analysis. And, again it is remarkable how often it made us of specifically scientific subject matter, for instance in the nonsense machines of Duchamp and Picabia.

The outcome of this classical period of modernism, can, I like to think, be symbolized by two figures whom I call the two Swiss Maxs—Max Ernst with his Surrealist 'Paramyths' made of collages cut from scientific textbooks, and Max Bill with his subtle abstract shapes that have the purity and some of the underlying algebra of projective geometry. But in between the paranoia and the mathematics the common or garden person has been left out of the picture.

In the more recent developments of painting some portions of him are perhaps creeping back. Action Painting from Pollock to Matthieu, with its emphasis on the gesture, reminds us that man is a biological creature with a musculature controlled by nerves. Abstract Expressionists, such as Wols and Guston, show how even the deepest levels of feeling are not entirely composed of the anthropomorphized concepts of Freud. But these are still scratchings at the two extreme ends of man's nature. The Social Realists who attempt to present him to us as an active being on the world stage, such as Guttuso or Lèger, show him either as a mere survival from the pre-scientific world or as a rather barren symbol—in neither case as a being with a rich intellectual and social life, and with a specifically scientific flavour.

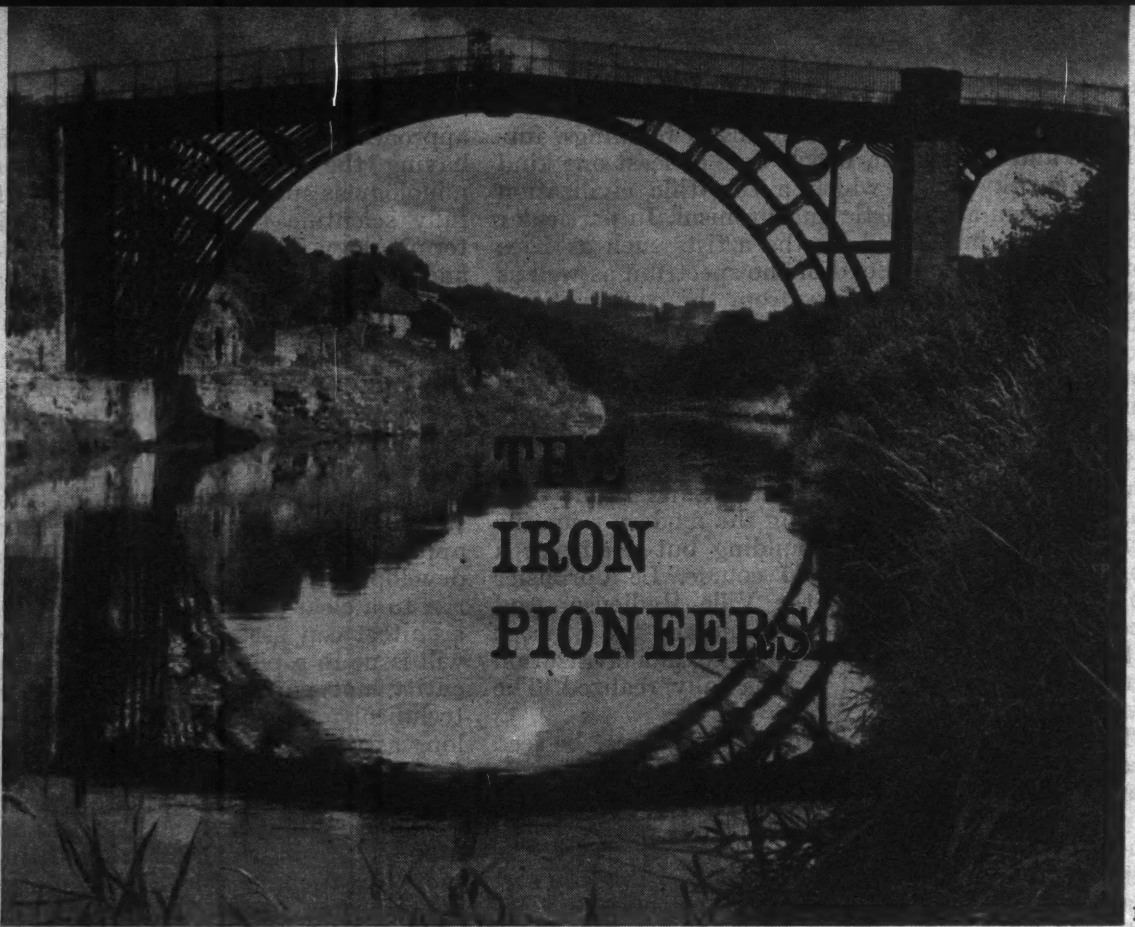
The search for the modern image of man has been recorded throughout the last fifty years by Picasso in an unbroken series of drawings and etchings of the painter and his model. They continue to the present day. In how few ages of the past did this problem press on a major artist as an unsolved problem throughout his whole life?

For a short period in the Heroic Age there was, perhaps, a glimmer of hope that the architects would do better than the artists in bringing into being the visual setting for a scientific world. In the early heyday of Gropius and Le Corbusier we saw the appearance of a whole series of new forms of buildings, furnishings and decoration, which were at least one kind of framework within which a scientific civilization need not seem a futuristic anachronism. In particular the Bauhaus, influenced by the artists such as Klee from the psychological end of the spectrum as well as others such as Moholy-Nagy from the constructivist end, held out the hope that a real synthesis might be in the offing. Unfortunately it did not quite materialize. Indeed at that time it could not, both because the political situation was too completely unresolved in the world at large, and for two more fundamental reasons. Firstly, because the enormous power of modern technology has as its result that what has to be created to bring the modern scientific world into being is not a building but a city or a landscape—a point which, of course, Le Corbusier realized in his dreams of the Ville Radieuse. And secondly, because even at the Bauhaus the concept of the nature of man as a person living in a civilization founded on science could not be fully realized. The time was not yet ripe.

The persons of a scientific civilization must be seen as entities which can be approached in all their aspects along avenues of scientific thought, just as the persons of religious civilizations were thought of as beings whose essential nature could be grasped by the religious apprehension. I do not mean by this any sort of a 'nothing but' approach. The first task of any science is to find some way of apprehending the real nature of the subject matter with which it is dealing. The religious approach to man does not deny that he is a physiological being needing food; the scientific approach should not have to deny that he is a being having the qualities referred to in religious terminology as spiritual. But we cannot be said to have a fully scientific picture of man until we have some terminology in which these qualities can be discussed and thought about, and which is at least as well assimilated to the general structure of science as medieval economics was to medieval theology.

It is perhaps not too optimistic to think that we are beginning to approach this stage in the development of the human sciences. The advances of individual and social psychology and social anthropology already make it possible for us to bring into the scientific world picture many aspects of human personality which, until recently, we have only been able to apprehend by unconceptualized feeling. The further development of these sciences will not of course give rise to a clear-cut series of forms which the artist and architect can use. One can hope, however, that they will issue in a picture of the human personality as an entity not entirely incongruous with the world of technical means by which he carries out his life. So long as we have to use, for instance, in designing the transport facilities of a city, a scientific outlook which can picture man as no more than a lump of transportable matter, we can hardly hope to produce an architecture in which his whole being is fulfilled. The more we become able to formulate all his needs as definitely as we can his physical requirements, the more possible it will be to create a setting for him as appropriate as the Gothic or Georgian architects did for the men of their time. It is only as we do that that a truly scientific civilization will be born.

THE IRON PIONEERS



1

First of the pioneers, the iron bridge over the Severn at Coalbrookdale, between Shrewsbury and Bridgnorth. Built in 1778 to the designs of Abraham Darby, a local iron-master, with John Wilkinson, another iron-master, and T. F. Pritchard, architect, of Shrewsbury.

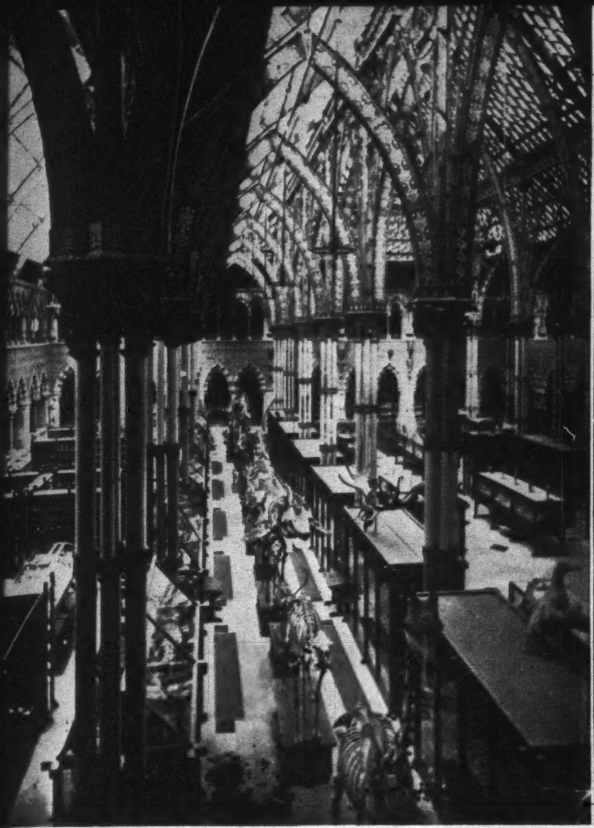
At the congress of the International Union of Architects, which takes place in London this month, the theme—the impact on architecture of new materials and techniques—is being discussed historically as well as practically. Since Britain is one of the places where the early impact of new techniques—especially of the use of iron and steel—can most effectively be studied in the field, the pages that follow are devoted to a reminder, in pictures and notes, of the important surviving examples of British pioneering in these and other materials, mostly dating from the industrial age which was itself pioneered by Britain nearly two hundred years ago.

In the architecture of the industrial age, Britain can rarely claim, as a matter of fact, to have been the undisputed first with any development—even the celebrated Iron Bridge at Coalbrookdale, above, one of the historic sites of industrial architecture, has rivals whose claims have been pressed by some scholars. But unlike the other claimants to primacy, Coalbrookdale has descendants—it may not be the absolutely first iron bridge, but neither was it an isolated stroke of genius: it was the father of the iron bridge-manufacturing business. This is typical of Britain's true contribution to early industrial architecture—the manufacturing capacity to generalize an invention into an off-the-peg structure, to turn a set of components into a nation-wide vernacular. It is not only the early dates of Strutt's or Bage's metal-framed mills that are important, but also the fact that they were part of a wave of mill-building in various materials, in which constant technical improvements were financed and underwritten by the sheer quantity of building being put up.

Again, the Crystal Palace was not only remarkable as a structural and spatial conception on a revolutionary scale, but also as proof that there existed the skill, experience and productive capacity to make it possible, not yet fifty years after the earliest tentative ferro-vitreous experiments in the glazed cove to the picture gallery at Attingham Park. The Crystal Palace also typifies the early maturity that came from the sheer volume of work in hand, a maturity that is also attested by the great train-sheds at main line terminals that followed soon after the Crystal Palace—King's Cross with its elegant double vault, St. Pancras with its great clear span, Paddington with its transepts and sophisticated decoration produced by the earliest known example of deliberate architect-engineer collaboration, that between Brunel and Digby-Wyatt.

It was the same capacity to produce that also made Britain one of the first large-scale exporters of prefabricated buildings to all parts of the world, and there is little doubt that it was this capacity to turn one day's inventive miracle into the next day's industrial commonplace that helped to produce the reaction against metal structure and industrial techniques after 1860. But the industrial tradition was not broken, and in civil engineering it went from strength to strength, the century concluding with one of the few structures that can compare with Gustave Eiffel's tower in Paris—the great cantilever railway bridge over the Firth of Forth.

But, in the first half of the century there was little elsewhere with which the achievements of British industrial architecture could be compared and it is mostly works of that heroic epoch that are included on the following pages: a brief gazetteer of the surviving records of the first mass impact of new materials and techniques.



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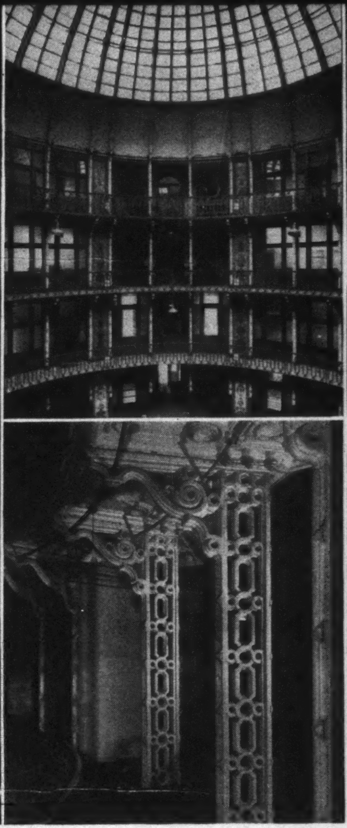

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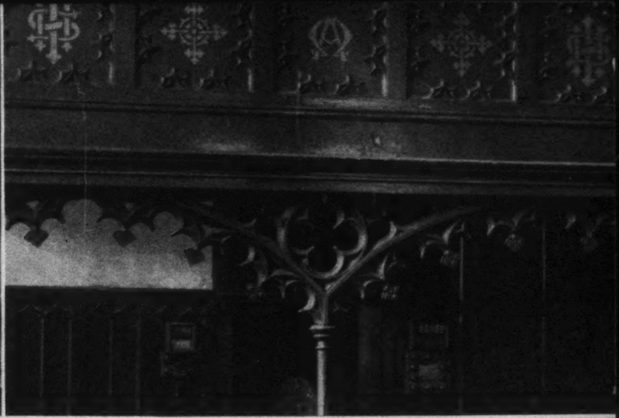

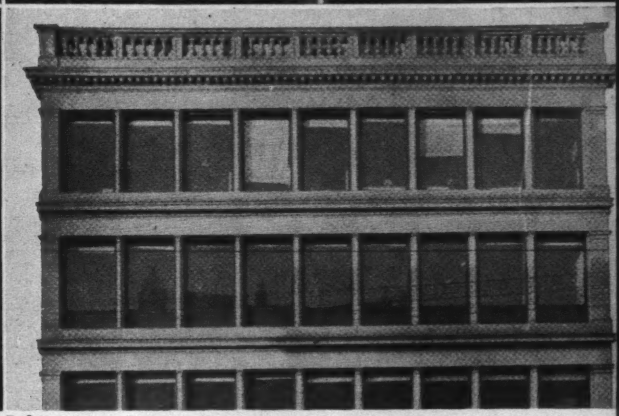

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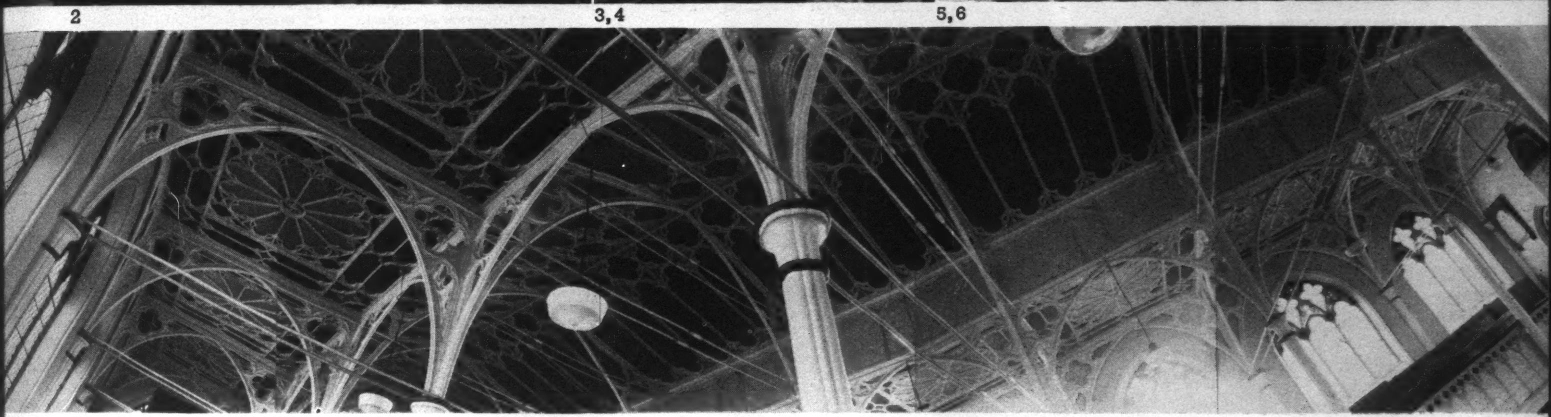

7

The Primitives

2, the main hall of the University Museum, Oxford, designed in 1855-59 by Thomas Deane and Benjamin Woodward. The first permanent glass-roofed display space of its kind, a surprising intrusion of traceried iron-work into a building otherwise executed with stern Neo-Gothic propriety under the eye of John Ruskin himself.

3, 4, interior view and a detail from the circular hall of the Coal Exchange, London, built in 1847-49 to the designs of J. B. Bunning. Though earlier than the Crystal Palace, it is a large permanent structure (the hall is some sixty feet in diameter) with extremely sophisticated cast and painted decoration illustrating the history and extraction of coal. Still standing in Lower Thames Street, but threatened by road improvements.

5, St. George's church, Birmingham; cast iron gallery-front, arch and pillar, 1822 by Thomas Rickman, best remembered as the classifier of the styles of English Gothic. Here seen at his more archaeologically correct, but for the carefree splendour of early Rickman, see 7.

6, upper part of the facade of Messrs. Paisley's shop in Jamaica Street, Glasgow. Designer unknown, date presumed to be about 1858, the purest of the Early Glasgow iron-framed warehouses (lacking the arched window-heads of the better-known warehouse on the corner of Argyll Street) it must yet be numbered among the primitives because of its stone cornice.

7, columns, arches and roof of St. George's church, Everton, Liverpool. Thomas Rickman's first church, completed in 1813, the elaborate ironwork cast and fabricated by John Cragg, ironmaster and churchman, at his Mersey Foundry. Although some components for two other Liverpool churches were cast from the patterns, neither equalled the airy grace of St. George's galleried interior.

8, 9, the staircase and kitchen of the Royal Pavilion, Brighton, by John Nash. The columns of the staircase, completed in 1815, are in cast iron imitating the form of bamboos, those of the kitchen, 1820, also cast iron, are in imitation of palm-tree trunks. The Pavilion also sports domes in the Indian manner with iron frames.

10, glass-and-iron cove lighting the picture gallery at Attingham Park, near Shrewsbury. John Nash's alterations to Attingham in 1807 involve his first use of iron in a domestic interior, possibly the first in any domestic work. Cast at Coalbrookdale, less than ten miles away, this cove is the ancestor of all iron plant-houses and thus of the Crystal Palace itself.

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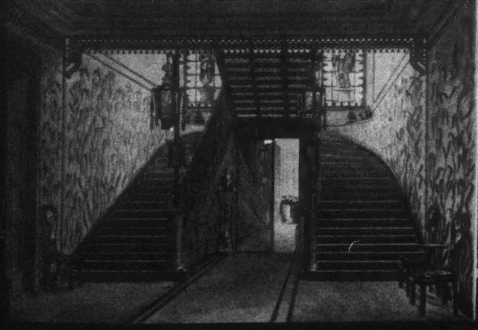

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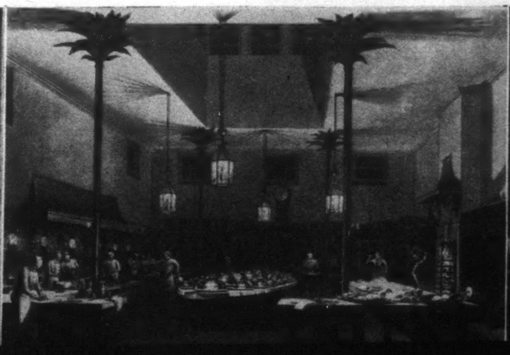

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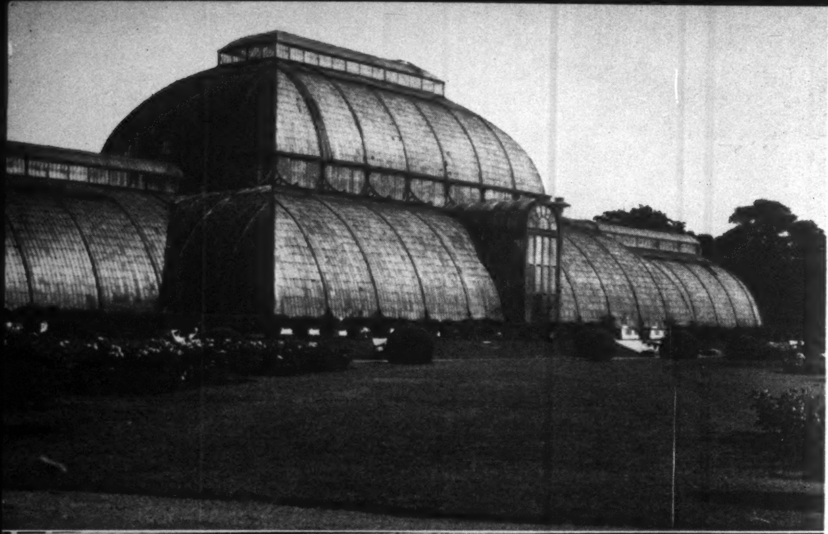

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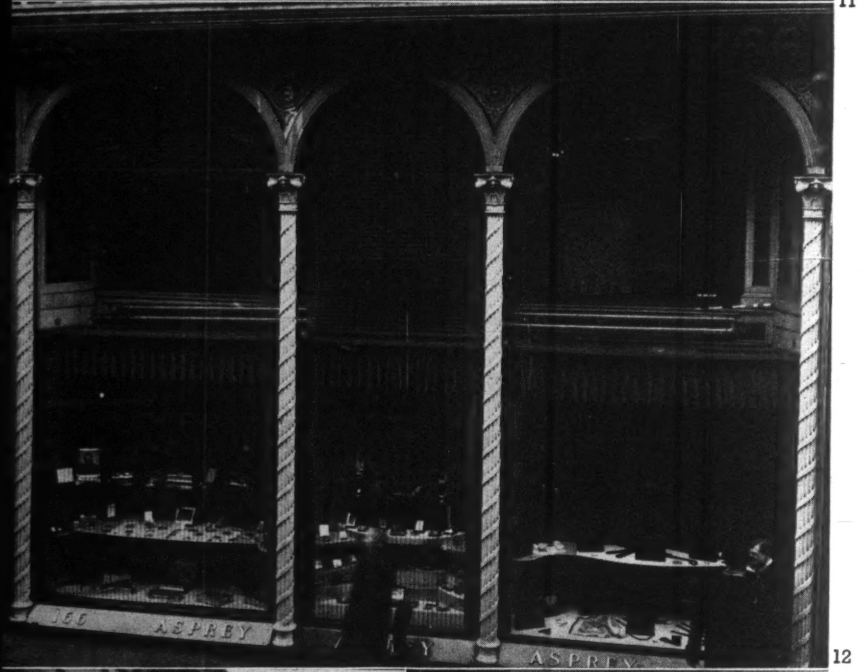

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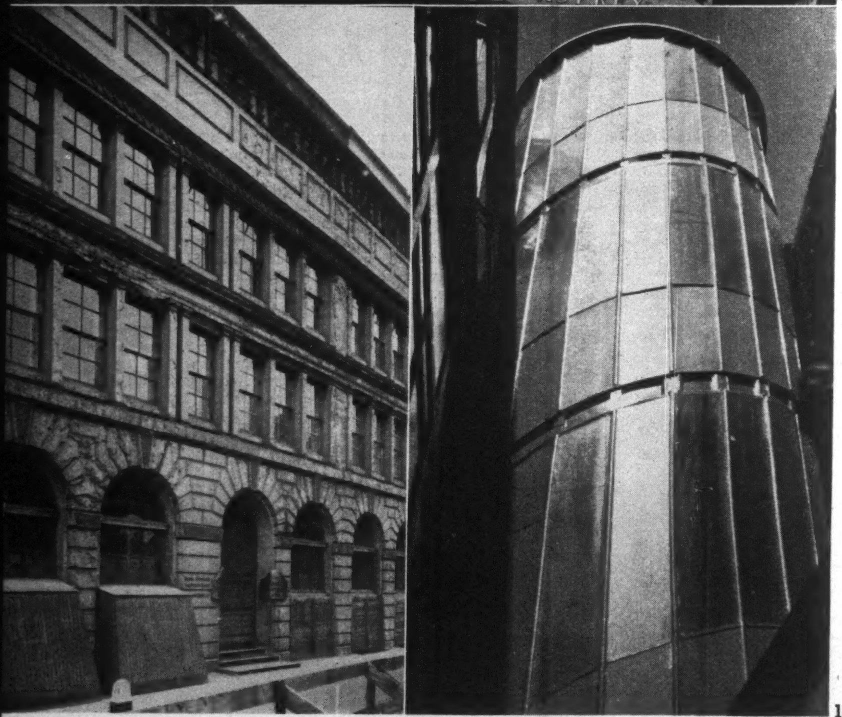

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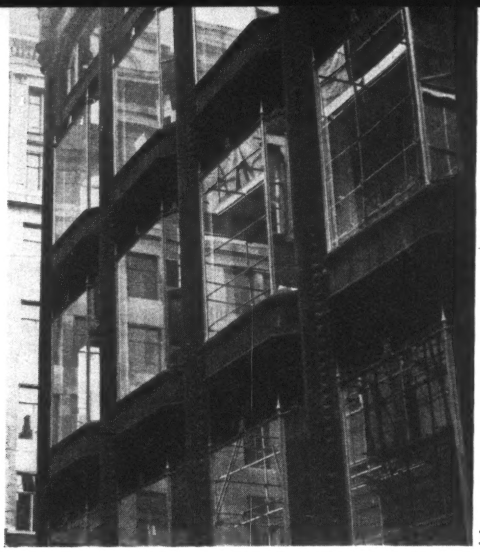

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The Glass Wall

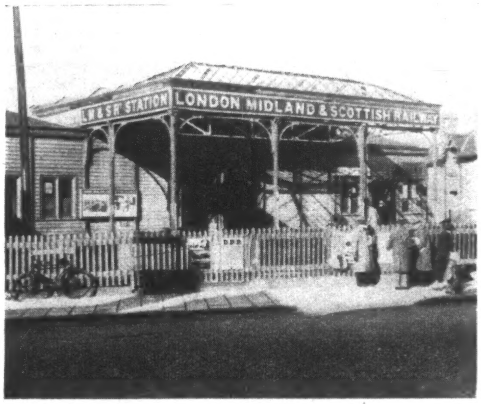
11, the Palm Stove, Kew Gardens, built 1845-47 to the designs of Richard Turner, engineer, of Dublin, and Decimus Burton, architect. One of the chief ornaments of the Royal Botanical Gardens, the Palm Stove is another predecessor of the Crystal Palace, one of the great green-houses in which the techniques of glass and iron were developed.

12, Asprey's shop front, New Bond Street, London. Presumably erected about 1865-66. Benson's, a little farther along the street, may be a year or two older, but cannot compare in the size of its sheets of plate glass with Asprey's still-spectacular double-storey windows.

13, offices at 4-6 Aldermanbury, just south of the area now cleared around Route 11, in the city of London. Built before 1845, stylistically unremarkable, but the windows of the upper storeys give almost continuous glazing right across the facade. Now abandoned and forsaken, the future of this pioneer is uncertain.

14, rear facade and glazed stair-tower of 16 Cook Street, Liverpool, designed by Peter Ellis, 1866. A few months later than his justly-celebrated Oriel Chambers (see 15) but even bolder in its use of an all-glass skin on the spiral staircase.

15, Oriel Chambers, Water Street, Liverpool. Built by Peter Ellis, whose architectural practice was established in the building from the time of its completion in 1865 until his death nineteen years later. Ellis's masterpiece, it has a permanent place in the history of nineteenth-century architecture as the first attempt to deduce an idiom, a style, from the facts of frame construction and overall glazing, instead of imposing a style derived from masonry upon them.



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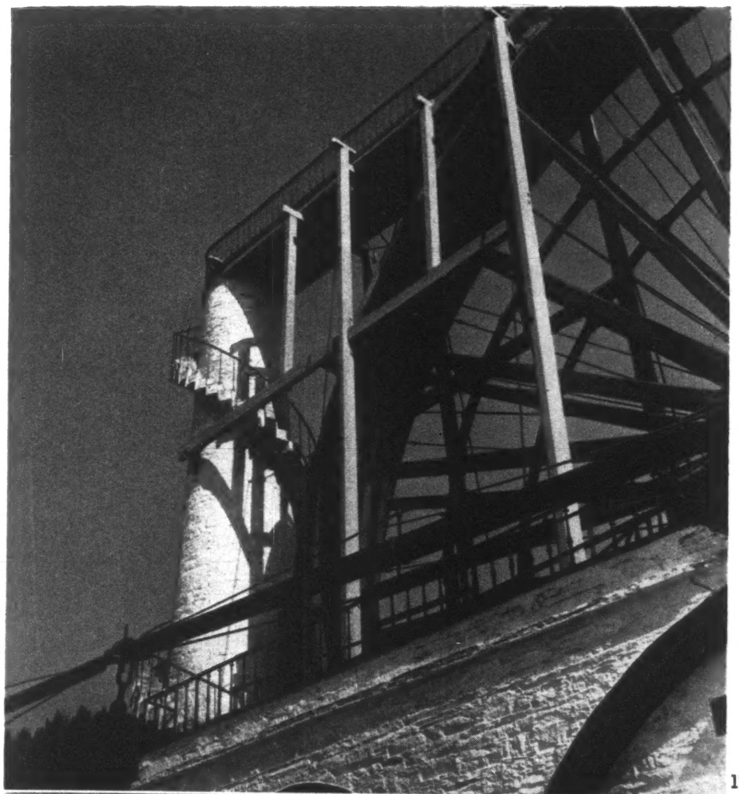
16, the Midland Station, Park End Road, Oxford. Built in 1851-52 by the engineers Fox and Thomas, it employs structural and glazing units from Fox and Thomas's greatest masterpiece, the Crystal Palace, on which they were Sir Joseph Paxton's engineers. Crystal Palace roofing was fairly extensively used for railway stations in the 1850's, but this is one of the few surviving examples still in use.



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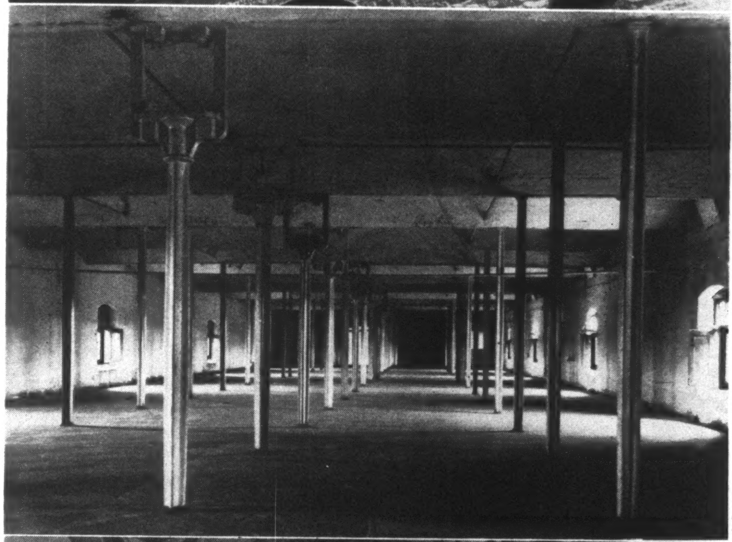

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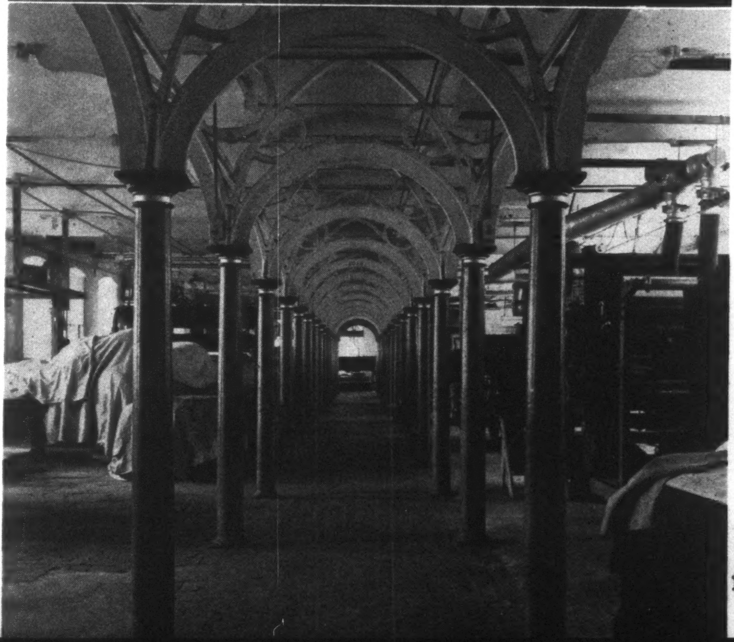


19

Sheds and Mills

17, the Great Wheel, Laxey, Isle of Man. A carefully preserved masterpiece of pre-machine technology realized in terms of the techniques of the age of steam and iron. Completed in 1854 by the engineer Robert Casement, its mill-wheel is one of the largest ever built—over seventy-two feet in diameter—its construction in wood and iron is one of the most sophisticated ever conceived, and its attendant works, transmitting its power by iron walking-beams to a distant pump, are among the most extensive to be driven by water-power.

18, spinning mill, Spring Gardens, Shrewsbury. Built in 1796 by Charles Bage this is, quite simply, the first metal-framed multi-storey building in the world. Although the brick exterior walls belong to an earlier technology, the cruciform double-taper iron stanchions are as ahead of their time as is the frame-structure conception. The building is still standing.

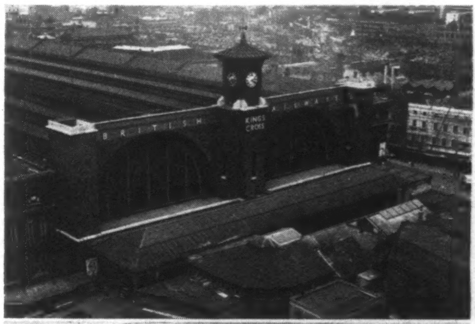
19, Stanley Mill, Stonehouse, near Stroud, 1813. Most handsome and sophisticated of the many early mills picturesquely sited in the Stroud valley in Gloucestershire.

Railways

20, 21, exterior and section of King's Cross Station, London. Lewis Cubitt's design, completed in October, 1852, has a Roman grandeur and simplicity, with the double vault of the interior expressed by a double arch on the facade, that even a clutter of later additions cannot spoil.

22, the train shed of St. Pancras Station, London, completed 1868. Behind Gilbert Scott's Flemish-Town-Hall facade, the engineer William Barlow erected a glass and iron vault with a span of 243 ft., which remains one of the most masterly conceptions of the age of the great London terminals.

23, Engine Shed, Camden Town, London. The inexpressive stock brick exterior of this 160-foot diameter round-house of 1847 conceals a fine interior with the roof carried on an inner ring of forty cast-iron columns. Designed by Robert B. Dockray, engineer to the London and North Western Railway.



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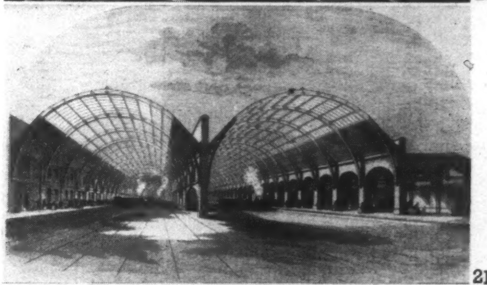

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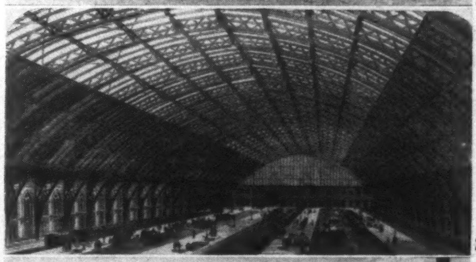

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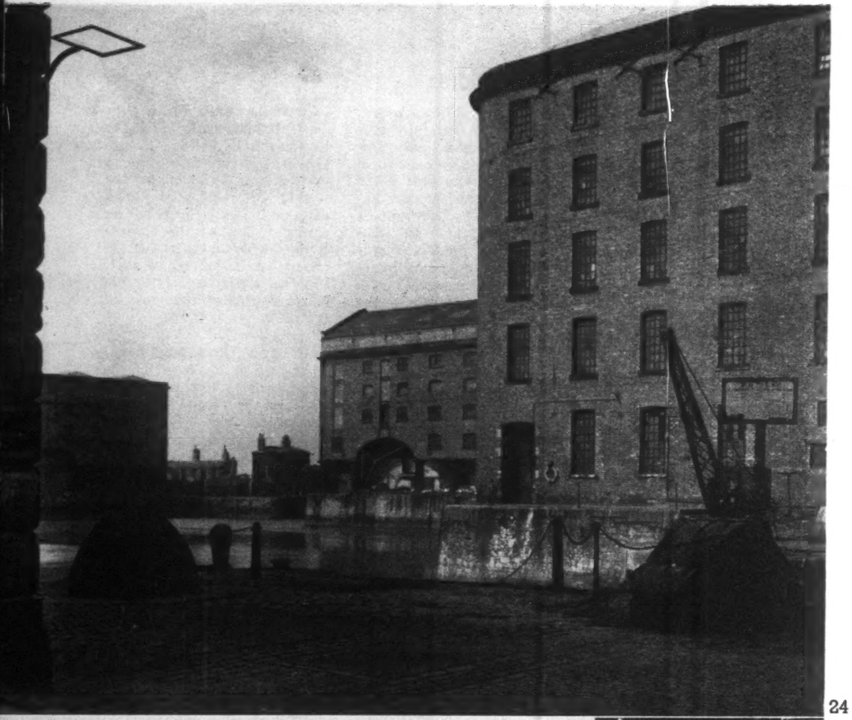
23

Docks

24, Albert Dock, Liverpool, built by Jesse Hartley and finished 1845. Though the order of the cast-iron columns is Doric, the intercolumniation is irregular to accommodate functional needs such as access to the brick-built warehouses, which enclose one of the noblest dock basins in Britain.

25, St. Katherine Dock, London. The farthest upstream of the London docks, lying just below Tower Bridge, designed by Thomas Telford and opened in 1828. Grave and simple brick warehouses again stand on cast-iron Doric columns, and in this, as well as the general conception, St. Katherine's was the model for other later docks besides those at Liverpool.

26, boat store, Admiralty Yards, Sheerness; designed 1858 by Colonel G. T. Greene. The date is important—while the rest of Victorian England is in retreat from glass and iron, Col. Greene makes a great step forward from the Crystal Palace, built only seven years earlier. Frame-and-fill aesthetic, exactly expressing the structural grid—using the earliest surviving exposed I-beams—of the interior.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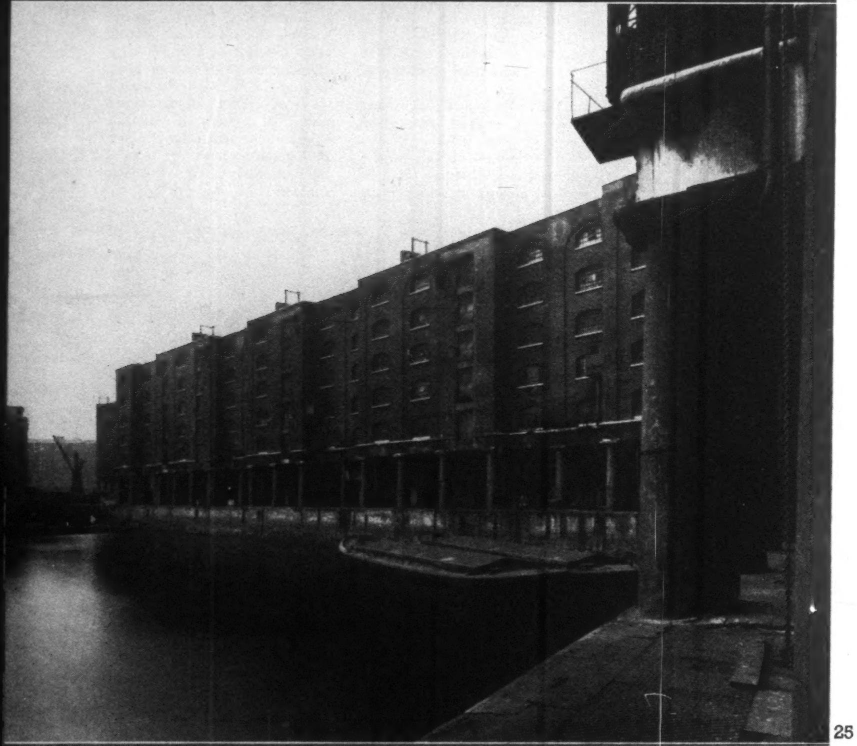
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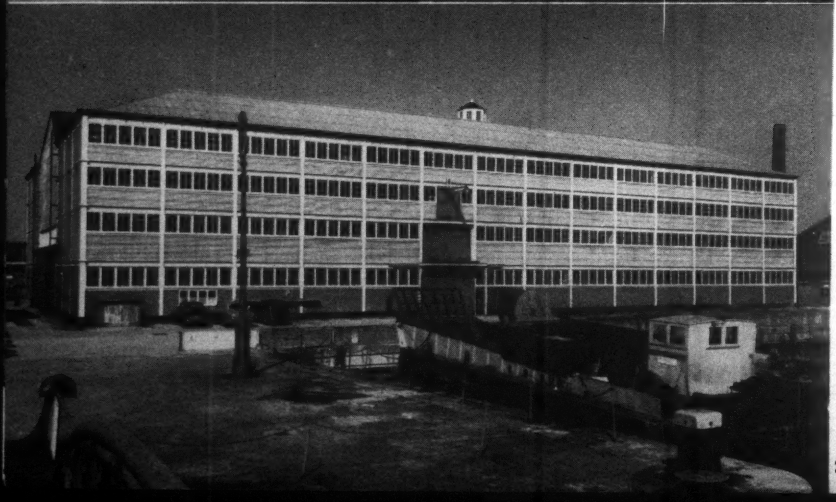
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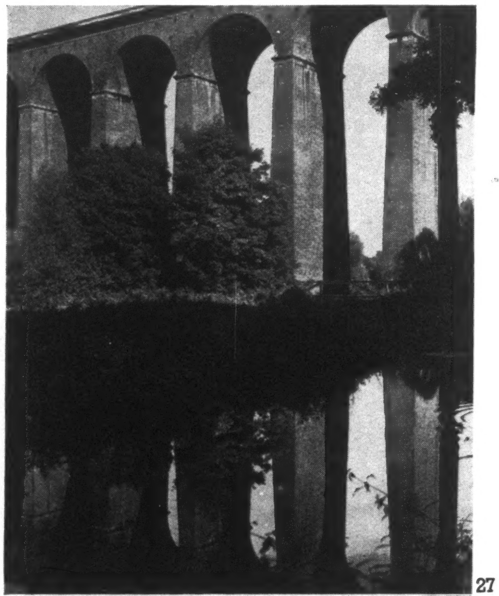
Bridges

27, Digswell Viaduct, near Welwyn, Hertfordshire. Designed by Lewis Cubitt in 1850, and fully consonant in its Roman scale and simplicity with his King's Cross Station (20, 21, above)—the viaducts of the early railway age were like nothing that had been built since the aqueducts of the Roman Empire.

28, Pont-y-Cysyllte Aqueduct, carrying the Shropshire Union canal over the river Dee near Llangollen. Completed in 1803 to the designs of Thomas Telford, whose masterpiece it is, eighteen slender brick piers carrying 40-foot cast-iron spans, 120 feet above the river.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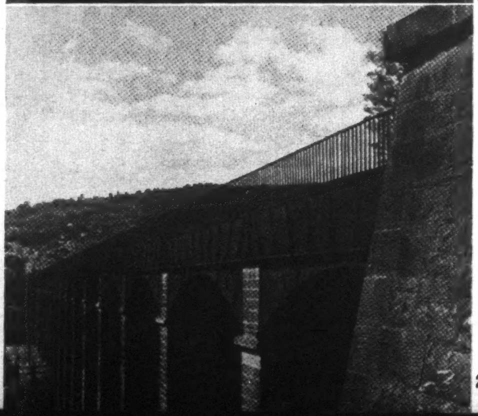
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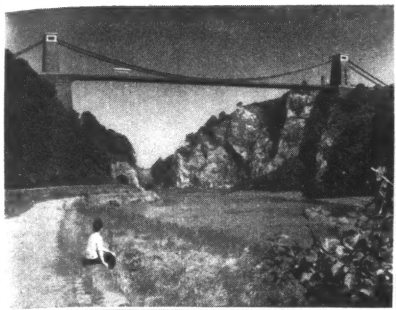
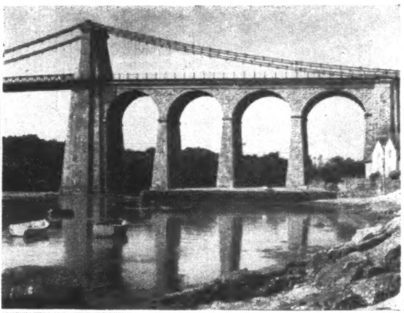
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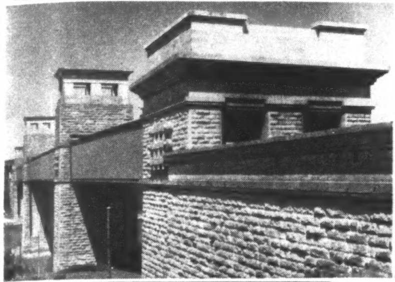
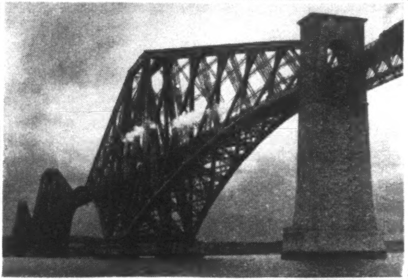
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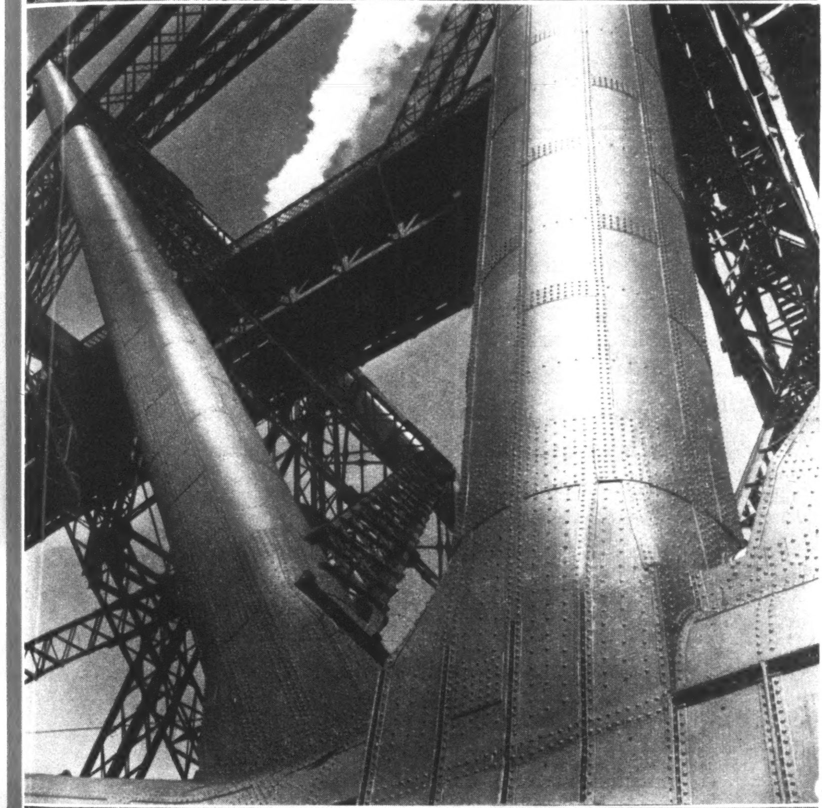
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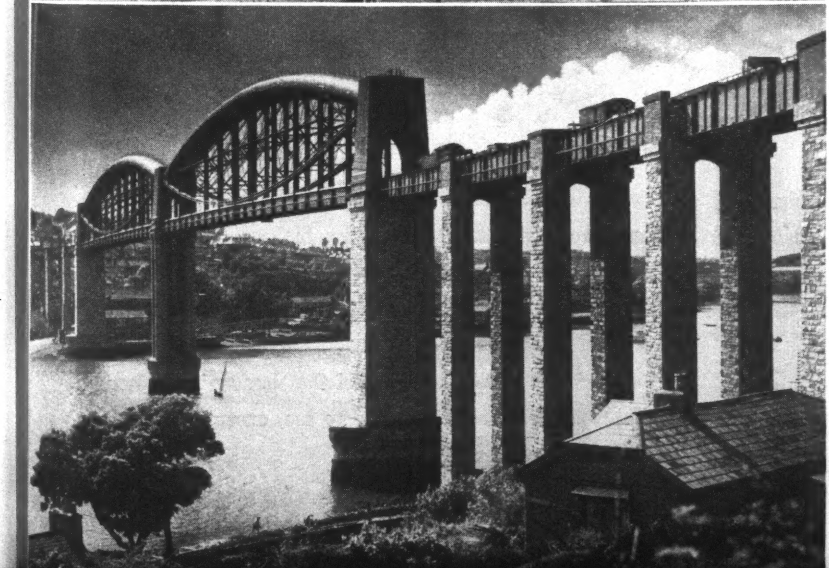
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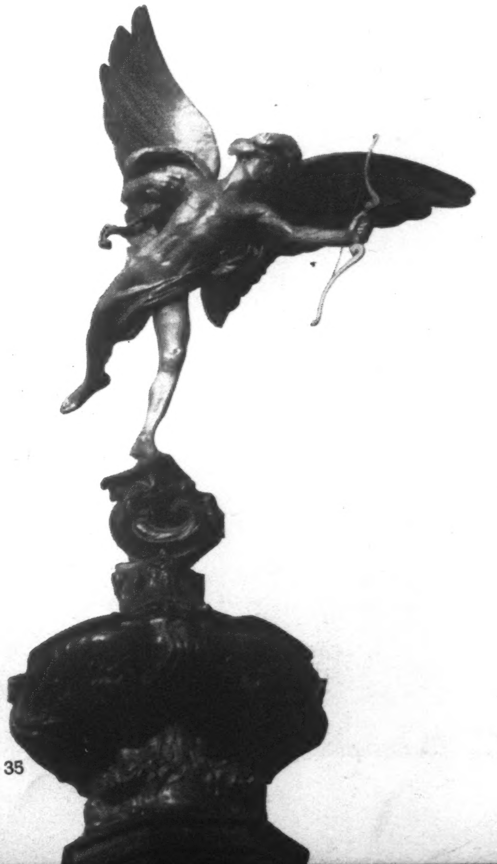
Bridges: continued

29, Clifton Suspension Bridge, Bristol. Designed by Isambard Kingdom Brunel, but completed after his death by William Barlow, 1863. Apart from its interest as a work of a great engineer, its site on the narrow Avon Gorge is the most romantic of any in Britain.
30, Menai Bridge, Anglesey. Telford's bold gesture of building a 550-foot span in 1826 was almost too bold, and the bridge has needed several minor reconstructions, concluding with a major re-build in 1938-40.
31, Britannia Bridge, Menai Straits. A mile from Telford's bridge and built twenty years later by Robert Stephenson, jr., engineer, and Francis Thompson, architect. Consists of two hollow box beams, each containing one track of the railway. The intended auxiliary suspension cables were abandoned after the structure had been calculated in detail by William Fairbairn and Professor Hodgkinson.
32, 33, Forth Bridge, Firth of Forth (between North and South Queensferry). Benjamin Baker and John Fowler's design of 1881 was a double first: the first cantilever bridge on this giant scale—the two main openings each span 1,170 feet—and the first long-span railway bridge in steel. The mixture of tubular and lattice members gives a structural aesthetic as individually characteristic as that of its only contemporary rival, the Eiffel Tower.
34, Saltash Bridge, near Plymouth. Designed by Brunel and opened in the year of his death, 1859. Its thoroughbred elegance suggests a perfected structural system, but its wrought iron compression tube and compensating suspension chains are the first groping steps towards the modern truss.

Aluminium Precursor

35, Eros (monument to Lord Shaftesbury), Piccadilly Circus, London. Erected in 1892 to the designs of the sculptor Alfred Gilbert, this well-loved extravaganza of Art Nouveau Classicism is the first permanent public structure in aluminium.


35

FLATS IN ST. JAMES'S PLACE, LONDON

ARCHITECTS | **DENYS LASDUN AND PARTNERS**

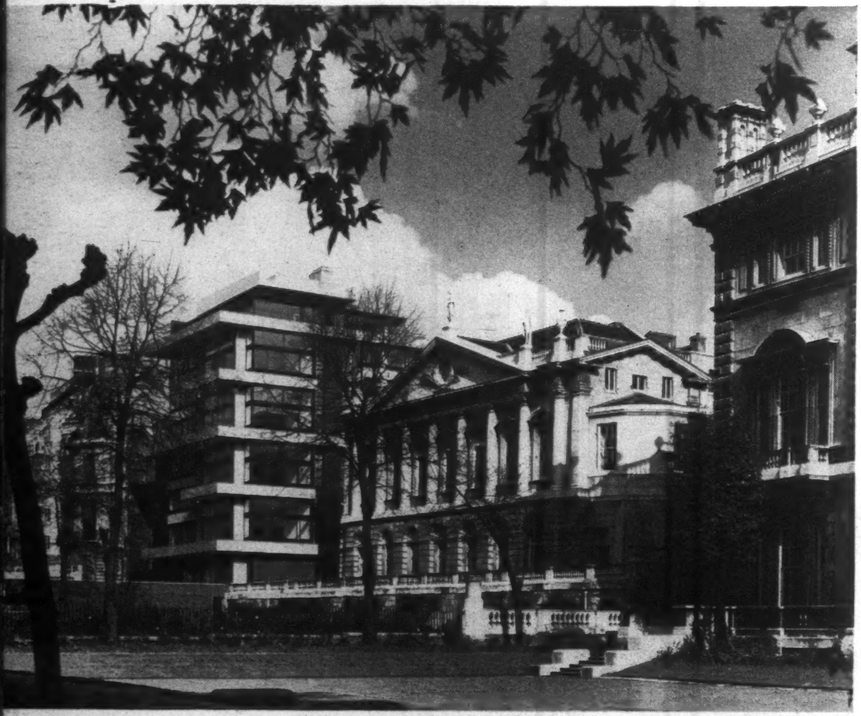
It is a truism that good buildings of any period are good neighbours irrespective of differences of style, but it is a truism whose truth is rarely seen because of the rarity of buildings that are good enough to make it come true. To see Denys Lasdun's new block of flats overlooking Green Park may be to receive—at first—a shock of incongruity, but an incongruity that fades as soon as the building begins to be appreciated for its true virtues.

It fits the scene, not because of any external styling—there is none—but because what is seen on the outside is an expression of the virtues within, and of nothing else. Basic decisions about the two-over-three section give the comparatively small rhythm of storey-heights on the St. James's side, where the neighbours are small houses in narrow streets. On the park side, the one-and-a-half storey living rooms immediately introduce a scale comparable to that of the Victoriana to the north, while the resolution of this double rhythm into two giant, three-storey bays by the one solitary floor-slab that traverses the park facade from side to side, brings in a monumental scale that echoes the heroic proportions of Bridgewater House to the south. The delicate Palladianism of Spencer House is enhanced, not vitiated, by the larger scale of its neighbours, both of them its juniors by one century, or two.

This happy result derives directly from the undisguised expression of the section, but the means of expression are either purely structural (giving value to the architect's conviction that the required luxury is a function of space) or concerned with environment control (windows, ducts, validating a belief that luxury is a function of service) and meticulous care over finish (validating a belief that luxury is a function of quality). There is nothing else to see, except that this is, quite simply, good architecture.

1, the flats from Green Park, showing the new building taking its place alongside Spencer House and Bridgewater House. 2 (facing page), close-up of the Green Park elevation.

1



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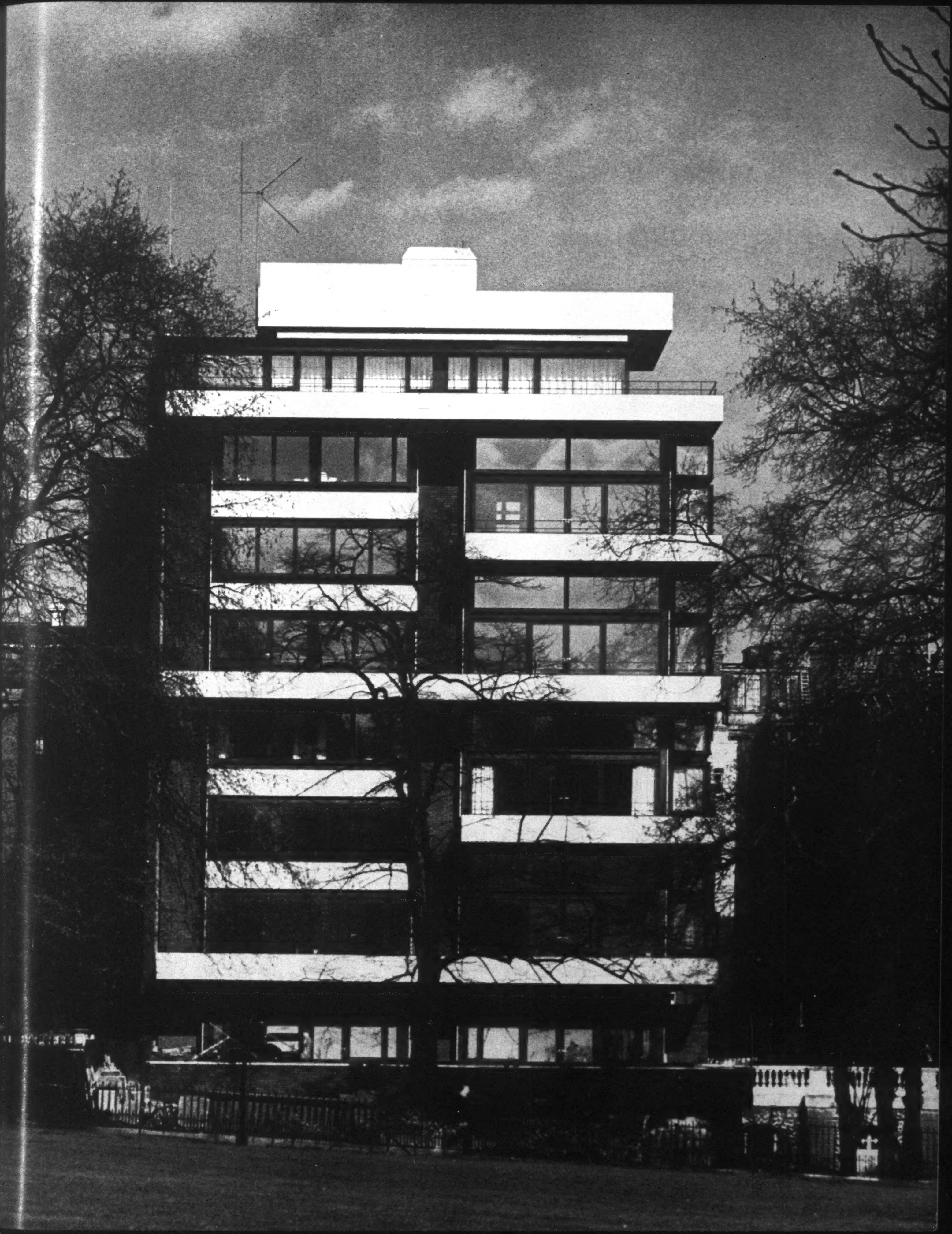

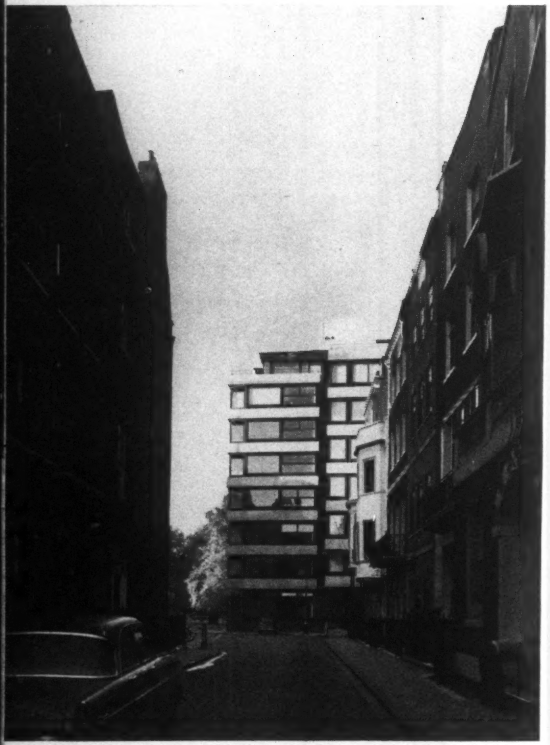

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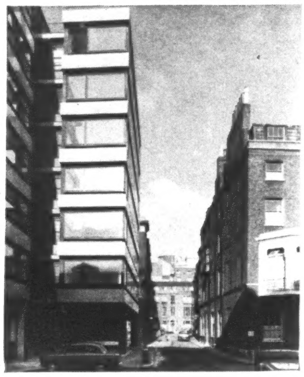

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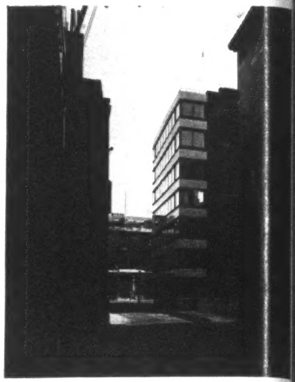
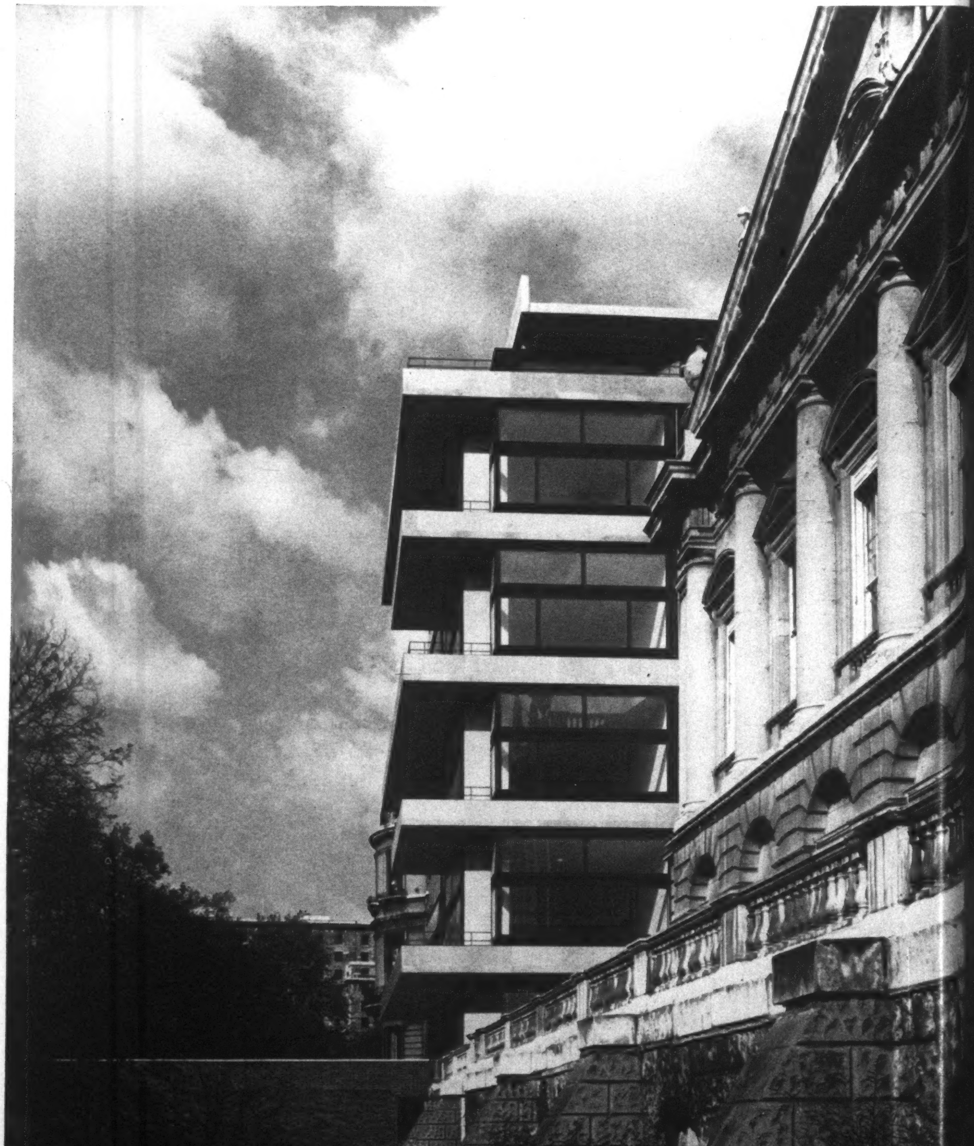


5

FLATS IN ST. JAMES'S PLACE, LONDON

Left and above, three street views from St. James's Place: 3, looking down the street; 4, looking north across the end of the street to the entrance of the flats; 5, looking in the reverse direction. The gap on the right of the flats is to be filled by another building. 6 (below), from the garden of Spencer House, showing the Green Park front of both buildings.

6



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A block containing five large and three smaller luxury flats on a site overlooking the Green Park. The site was previously occupied by a pair of Georgian houses which were destroyed during the war, and is at the end of a row of such houses (many now replaced by flats) running southwards from the Ritz Hotel at the corner of Piccadilly. Separated from the new block by a small gap is Spencer House, a pedimented 18th-century Palladian mansion designed by Vardy.

The flats have a basement garage, with space for 12 cars, and an entrance-hall, a caretaker's flat and one small flat (with garden) on the ground floor. The main accommodation consists of four large and two smaller flats on the first to sixth floors, and a penthouse flat above with its own roof-garden. The four large flats have 13ft.-high living-rooms, made possible by the planning of the whole block on split levels (see drawings on right) with the smaller flats set in on one level only. The flats are designed with the object of providing spatially well proportioned living accommodation with maximum flexibility in the arrangement of rooms, at the same time making the most of the views over Green Park. Each floor is organized technically (i.e. in its distribution of heating, lighting and service ducts) so that future change will not be inhibited, the only fixed elements being the bathrooms, kitchens, service ducts and vertical circulation.

The fabric has been designed to give a high standard of finish with good sound and thermal insulation; also with the minimum in the way of future maintenance. Overall stability is provided by a reinforced concrete core containing lifts and staircases. Otherwise the structure consists of reinforced concrete columns with 7½in. thick *in situ* floor-slabs and wide shallow edge-beams supporting 7ft. cantilevered balconies. In the penthouse structure the parapets are beams rooted in the main tank- and plant-room. They cantilever 25ft. in one elevation and 14ft. on the return, to allow an unobstructed aperture. Here the concrete is exposed, with a white finish.

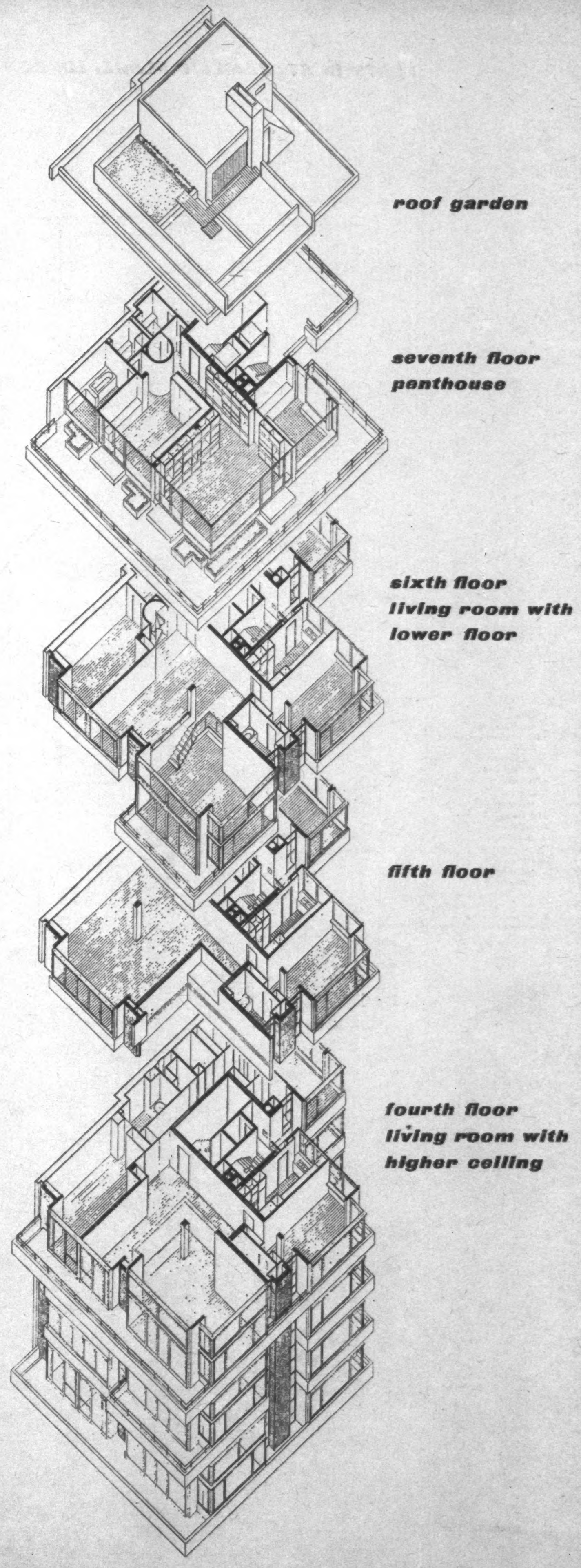
Elsewhere the *in situ* concrete structure is clad with 1½in. thick Baveno grey granite with white vitreous mosaic on the soffits. There are concealed built-in gutters on all floors over the entrance-hall to deal with watershed. Window sub-frames are of pressed grain-blasted bronze sections. External ducts (and the blank north wall, which will later be hidden by an adjoining building) are faced with blue engineering bricks. The roof parapet has a track for a travelling cleaning-cradle.

For sound insulation, all windows are double-glazed and floors are floated on battens fixed to insulated clips set in concrete, with fibre-glass quilting laid between the battens. Bathrooms that adjoin living-rooms are structurally isolated, and cavity walls separate the bedrooms. Mechanical equipment is mounted on anti-vibration bases, and noise-transmission through ducts is prevented by labyrinthine acoustic baffles. Ducts are also lined with acoustic felt.

For thermal insulation, all concrete walls are lined with cork and window-frames are packed with expanded polystyrene. The deep overhang of the balconies will cut off the high sun in summer.

The heating of the flats is by convectors designed as part of the window layout and served with low-pressure hot water. The temperature in each room can be separately controlled by thermostat.

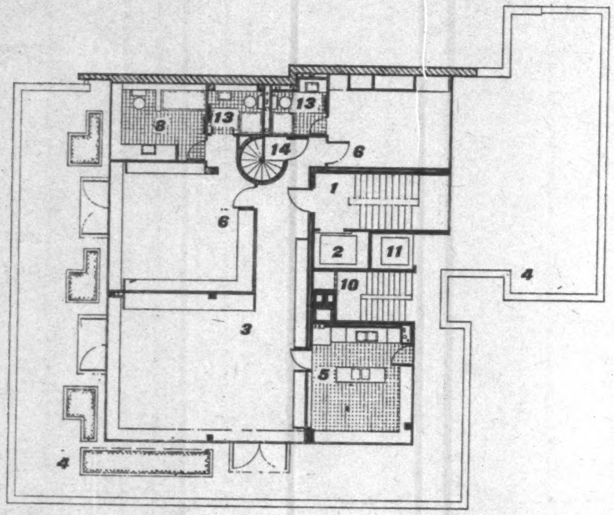
Partner in charge, Alexander Redhouse. Executive architect, Lyall Addleson. Assistant architect, Graham Lane. Consulting engineers, Ove Arup and Partners.



axonometric view, with floor-levels separated to show the internal spatial arrangement.

FLATS IN ST. JAMES'S PLACE, LONDON

7 (facing page), close-up of the south-east corner of the building —from first floor upwards—with the trees of Green Park beyond. The bedrooms on the right are at the ordinary floor levels. The double-height living-rooms, left, are achieved by the split-level planning shown in the plans below and the axonometric drawing on the preceding page.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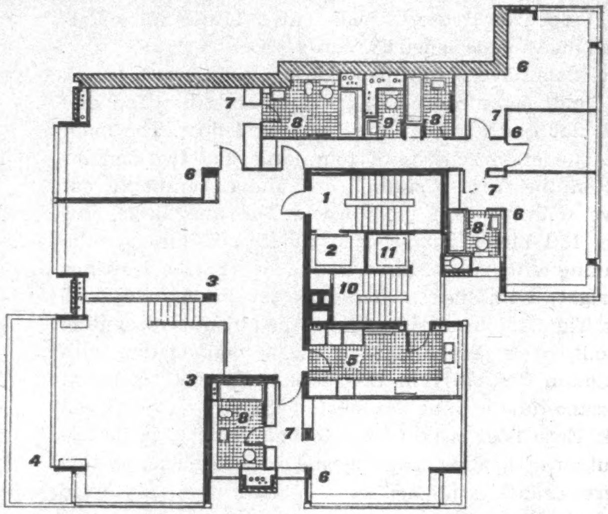
penthouse plan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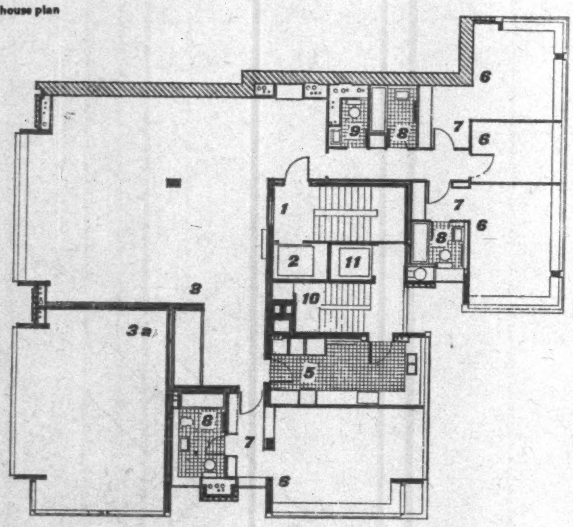
third and sixth floor plans

key
1, main stair.
2, passenger lift.
3, living room and dining space.
3a, upper part of living room of flat below.
4, terrace.
5, kitchen.
6, bedroom.
7, dressing.
8, bathroom.
9, cloakroom.
10, service stair.
11, service lift.
12, entrance hall.
13, shower.
14, stair from sixth floor flat.
15, car ramp to basement.
16, private garden.
17, private gate to Green Park.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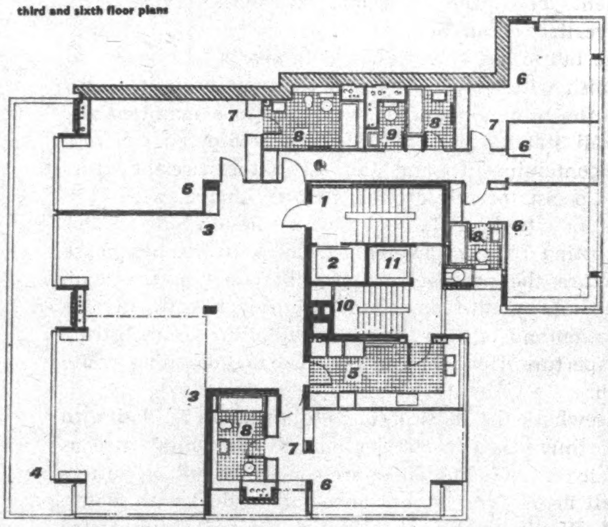
second and fifth floor plans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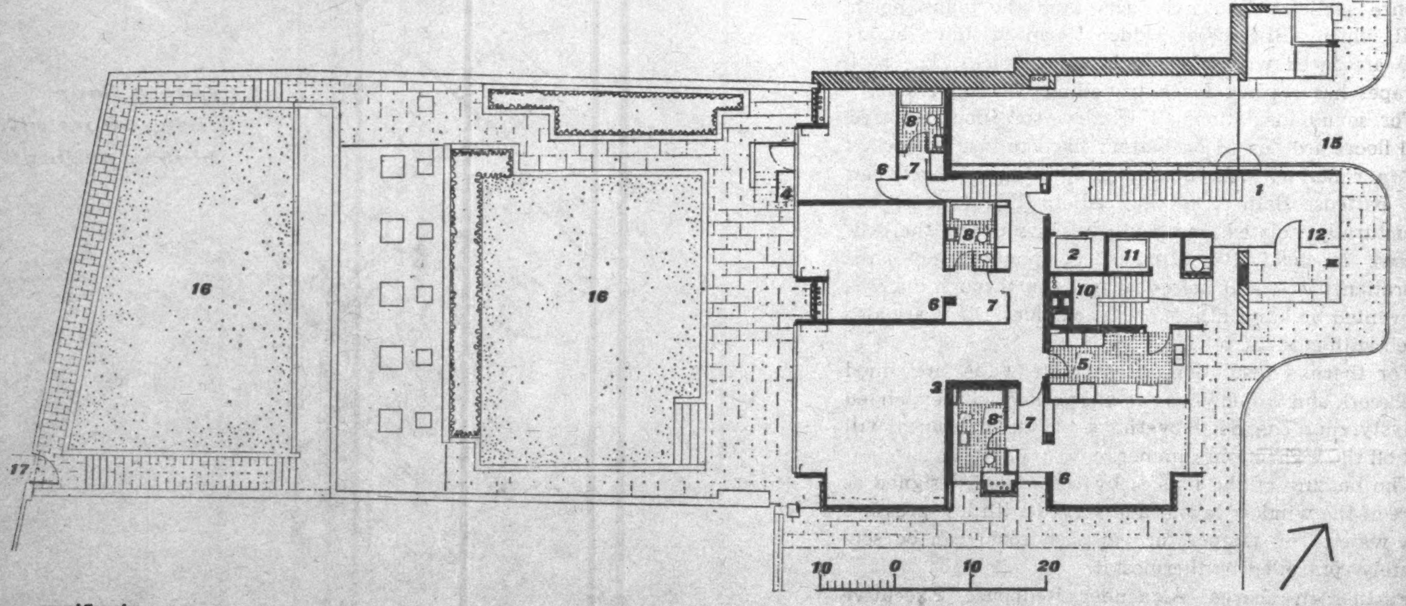
first and fourth floor plans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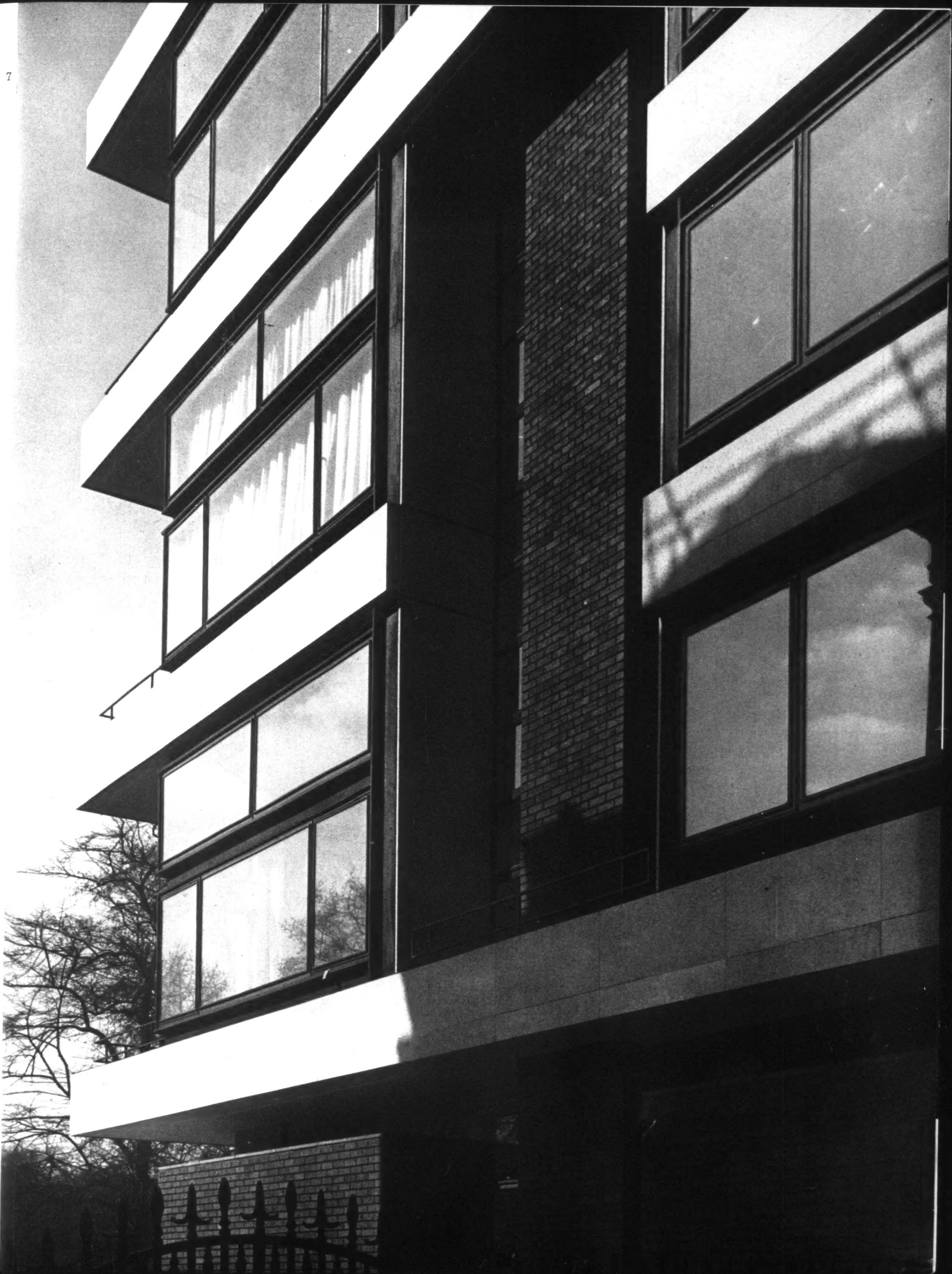
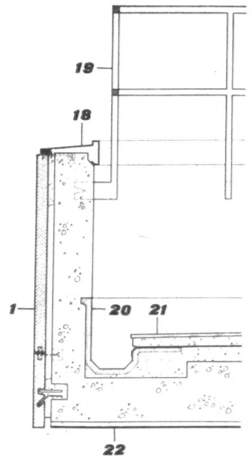
ground floor plan

7



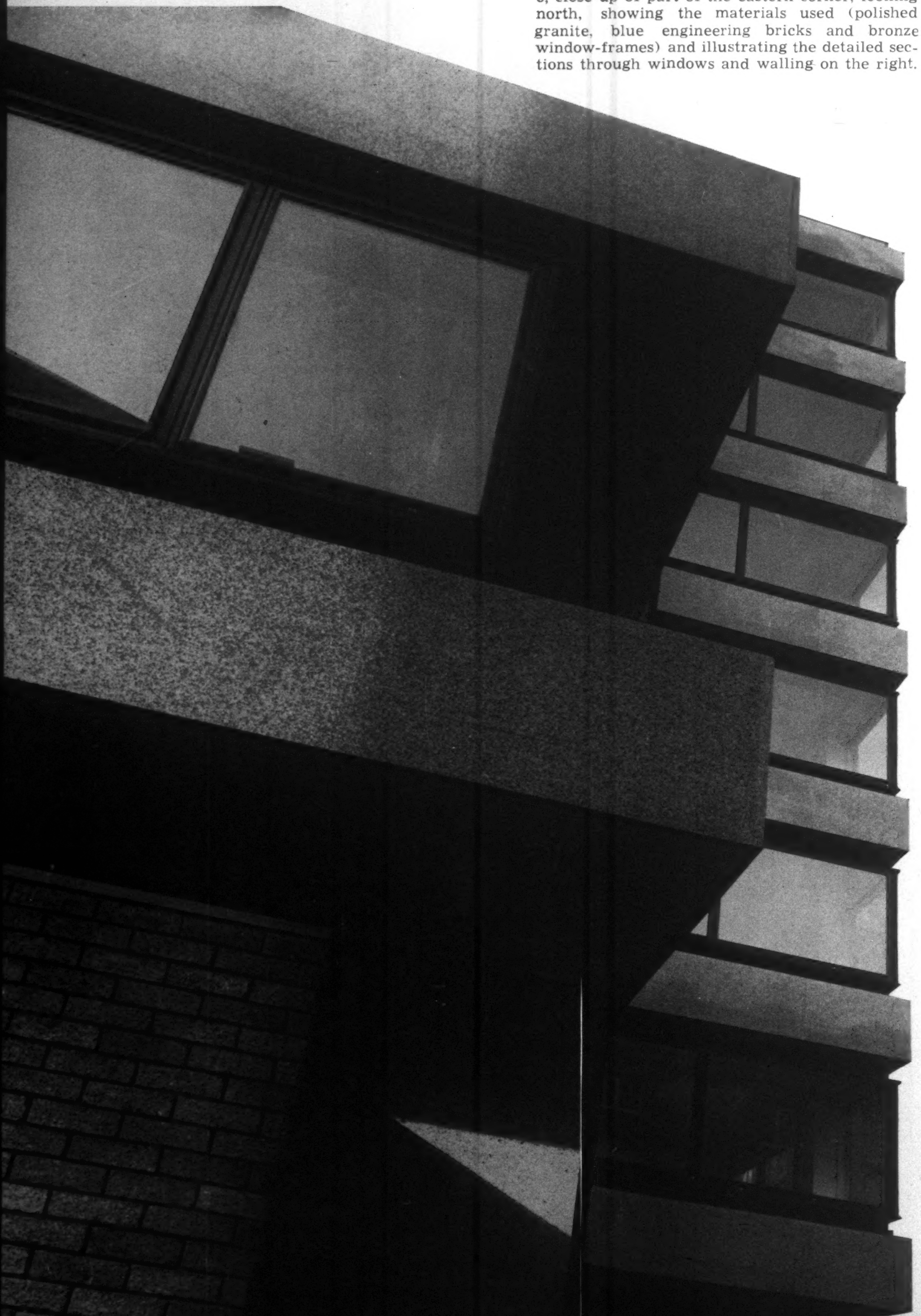
key to details

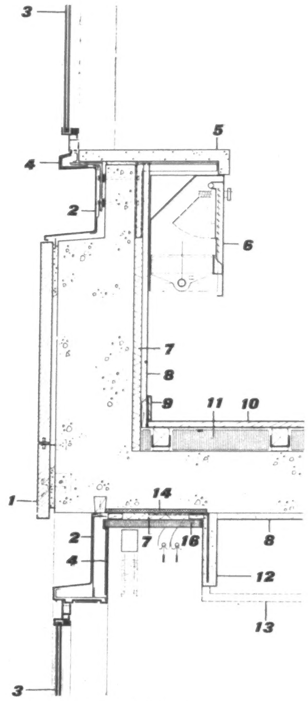
1, Baveno grey granite.
2, pressed bronze with grain blasted matt finish.
3, double glazing panel.
4, ½ in. thick expanded polystyrene fixed to inner surface.
5, terrazzo cill supported on angle brackets.
6, casing to convector heater with adjustable damper control.
7, cork insulation to reinforced concrete.
8, plaster.
9, hardwood skirting.
10, hardwood strip flooring laid on wood battens in patent insulated floor clips.
11, uncompressed fibre glass quilt laid between floor battens.
12, reinforced fibrous plaster board.
13, suspended ceiling to living rooms.
14, expanded polystyrene cast into reinforced concrete slab.
15, window ventilators operated by remote control.
16, 1 in. blockboard for fixing curtains and blinds.
17, porcelain enamelled gutter.
18, pressed bronze cill.
19, mild steel handrail.
20, asphalte gutter.
21, vitreous tiles to terrace.
22, white vitreous mosaic.



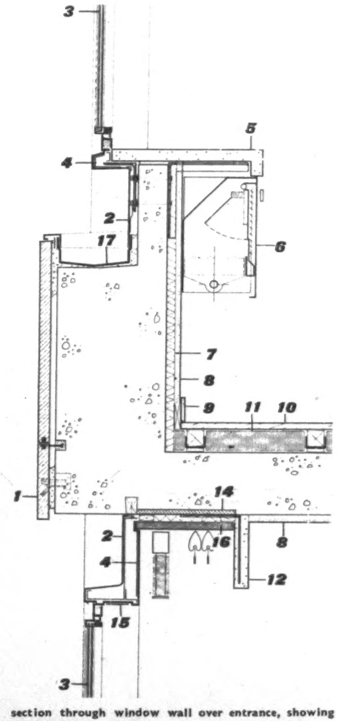
section through balcony

8, close-up of part of the eastern corner, looking north, showing the materials used (polished granite, blue engineering bricks and bronze window-frames) and illustrating the detailed sections through windows and walling on the right.

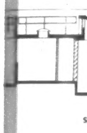


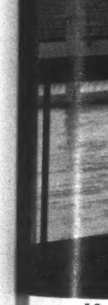


section through typical window wall



section through window wall over entrance, showing concealed gutter





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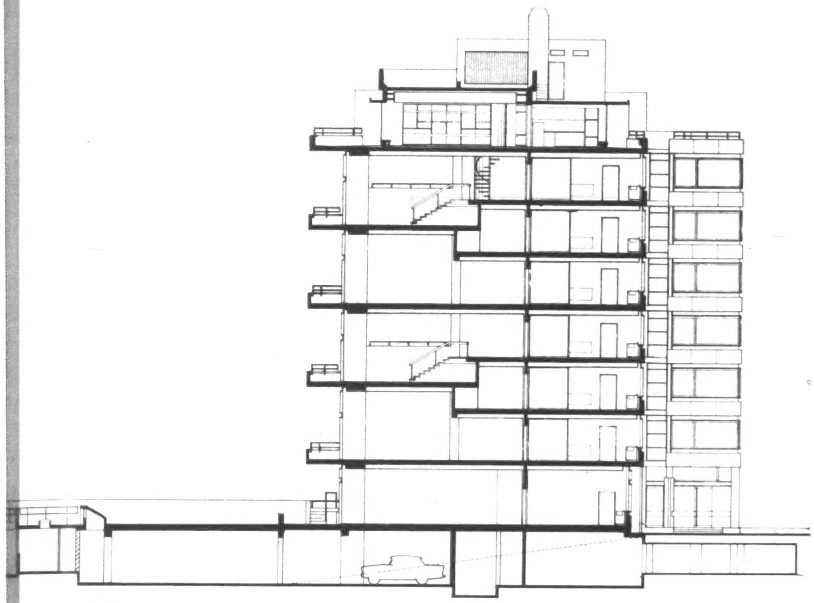
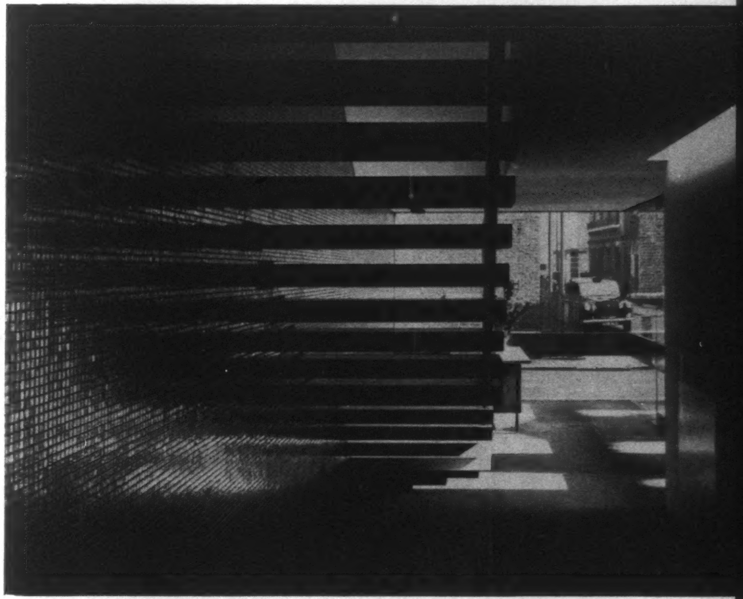
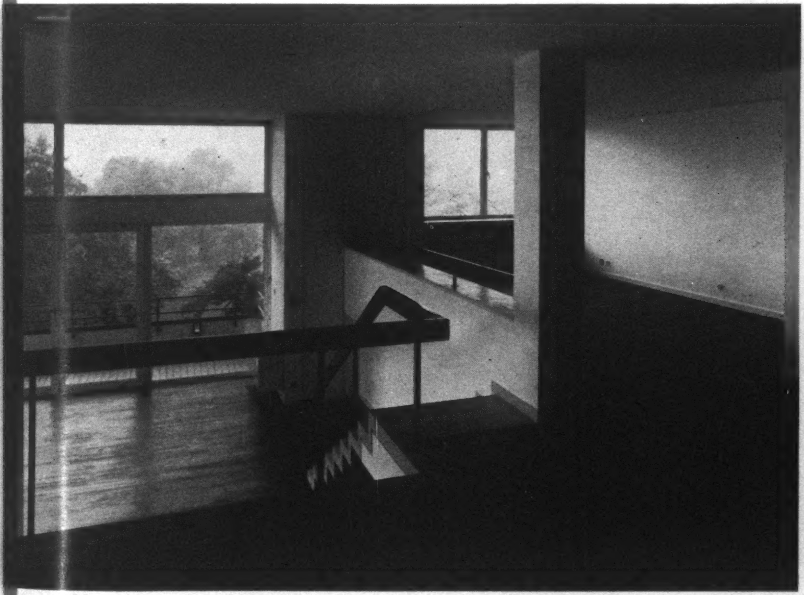




9

9, the entrance hall, looking from in front of the lift towards St. James's Place. The entrance doors are in the glazed wall on the right. The walls are lined with gold mosaic. Below, two views of living-rooms before furnishing: 10, looking down into a two-level living-room with dining-gallery on right; 11, living room with high ceiling over main area. Both photographs show the wide balconies with view over Green Park.



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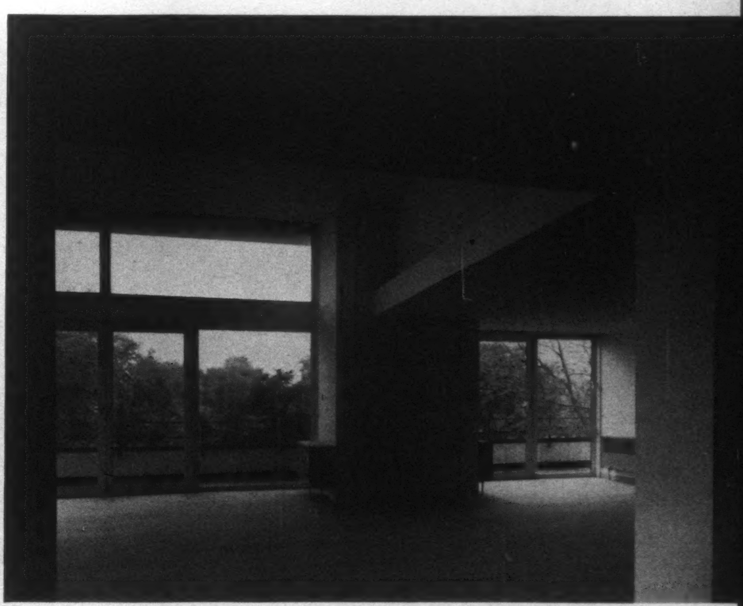

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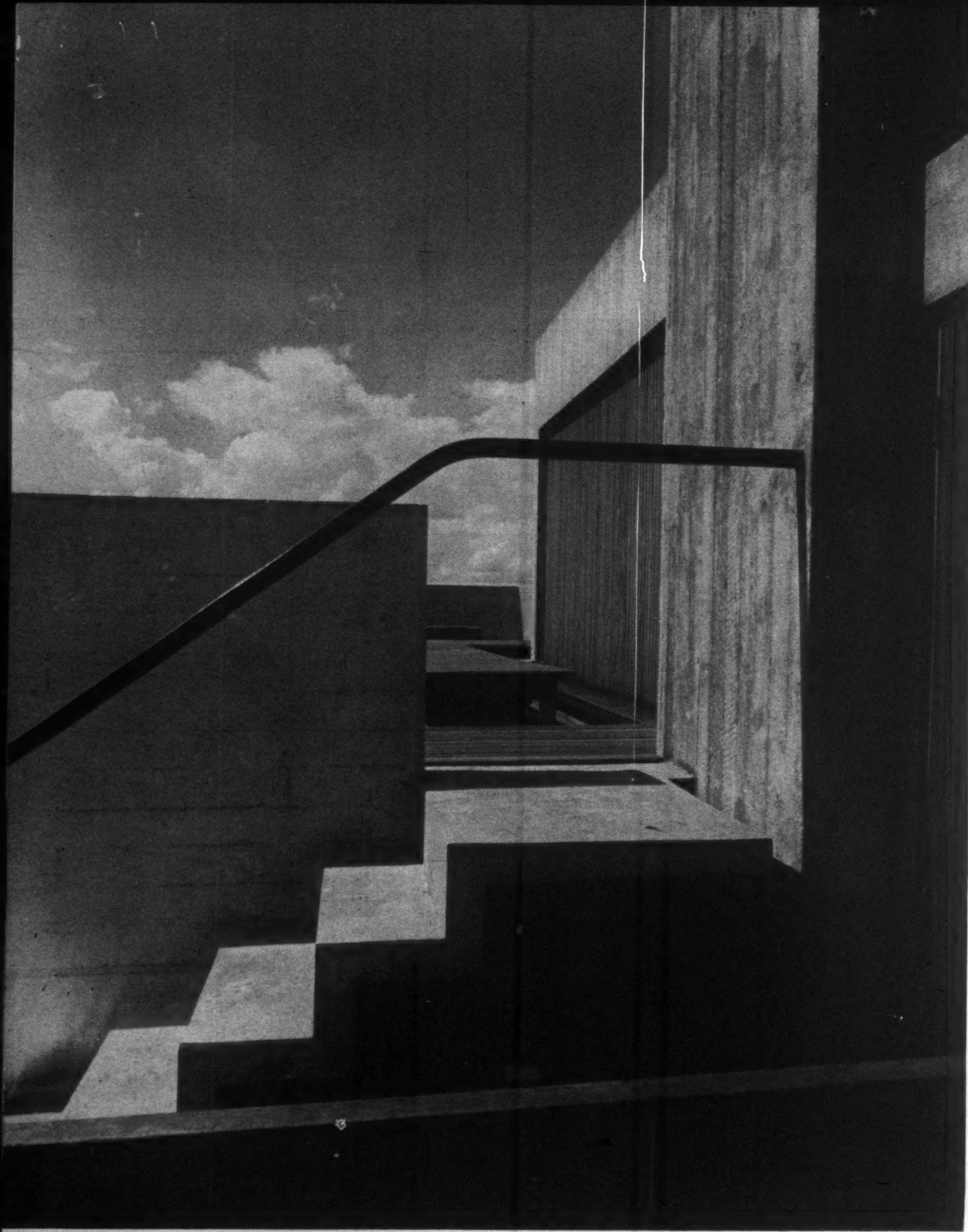
FLATS IN ST. JAMES'S PLACE, LONDON



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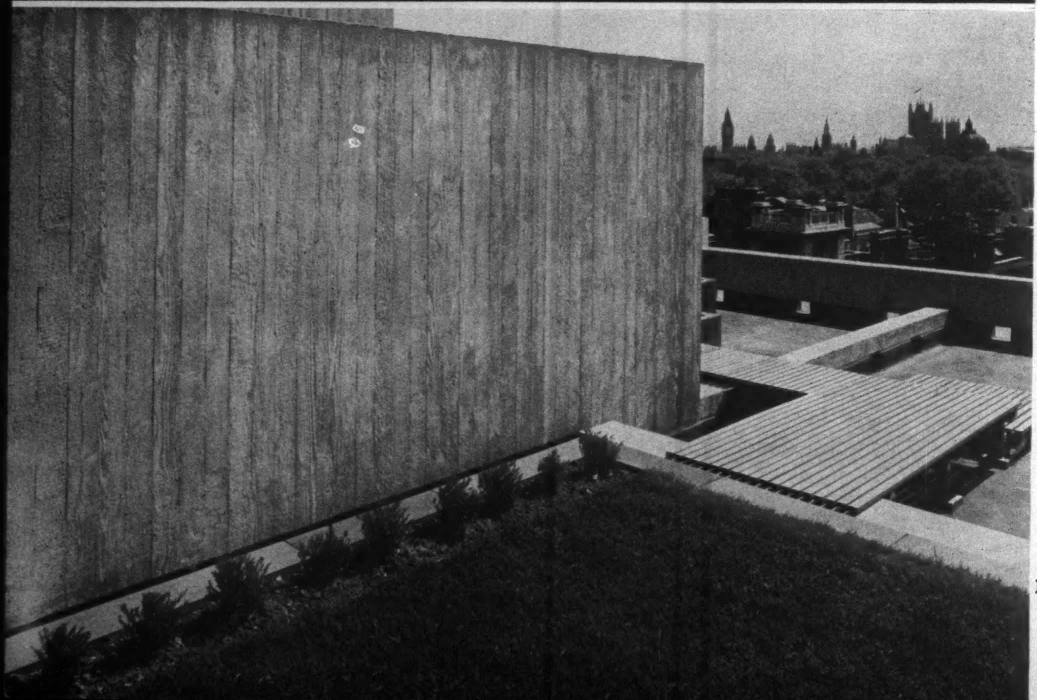
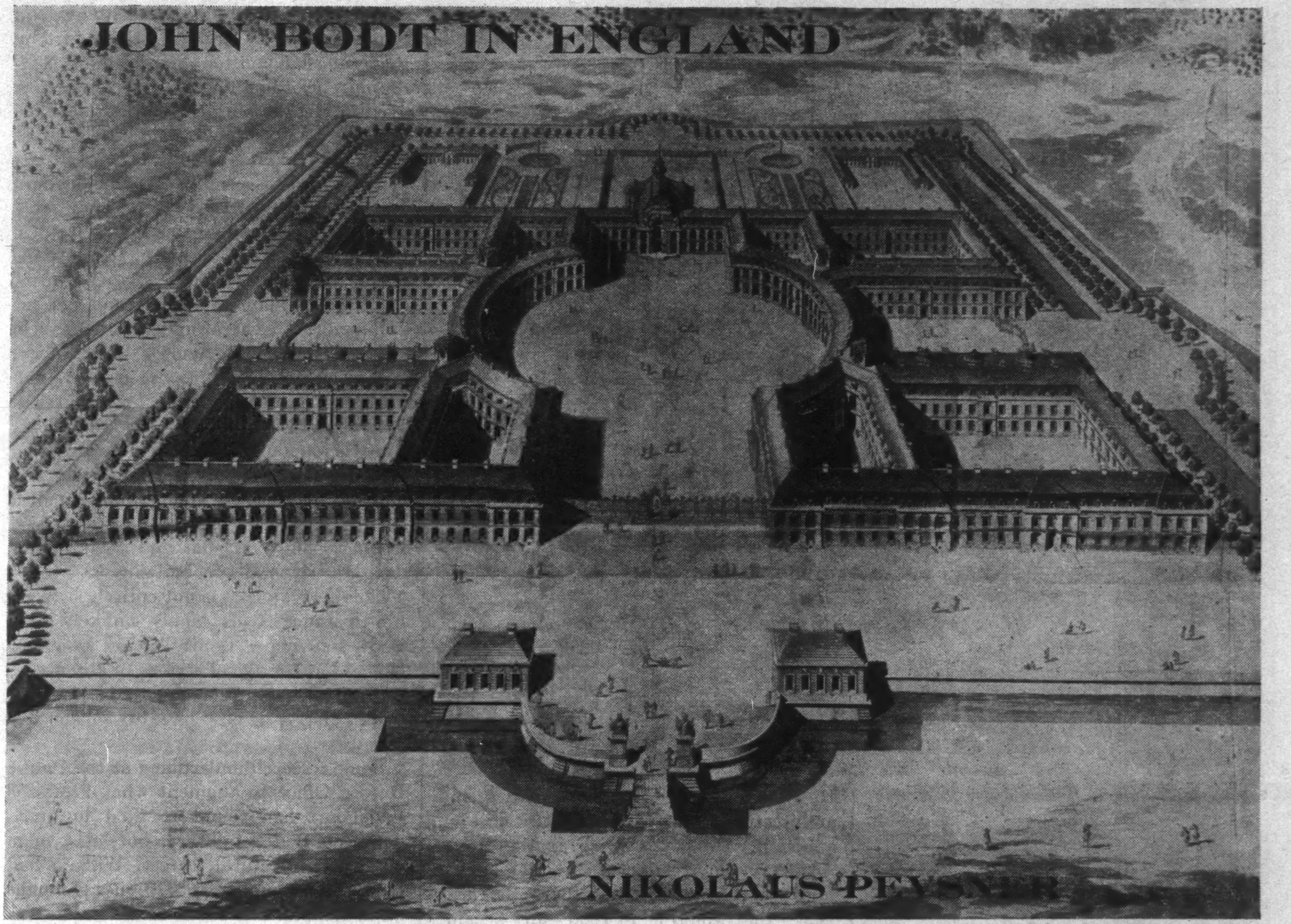


13

12, the approach to the penthouse roof-garden. 13, part of the planted area of the roof-garden. Both photographs show the unusually high quality of concrete finish achieved in the building.

photographs
by Behr

JOHN BODT IN ENGLAND



NIKOLAUS PEVSNER

1, *design by John Bodt for Hospital for William III, presumed to be sited at Greenwich.*

The two articles that follow discuss a seventeenth-century architect whose work is little known and whose international activities are of particular interest at this time when, because of the IUA congress, the international ramifications of architecture are in many people's minds. Bodt was born in France and worked in Holland, Germany and England. It is his English activities that are discussed by Dr. Pevsner and Mr. Harris, based however on German researches by Professor Heinz Ladendorf.

'Bodt or Bott (Johann or Jean de) was born in Paris in 1670. Being compelled in 1685 or 1686, as a Protestant, to quit France, he went to Holland, and accompanied the expedition of the Prince of Orange to England in 1688, as a military engineer. According to *Berlin and its Treasures*, 8vo, London, 1855, he took an active part in the erection of the new buildings, after the fire of 1691, at Whitehall in London. In 1700 he was named by the elector of Brandenburg, as successor of Gruneberg, chief architect at Berlin, where he continued the building of the arsenal, with many alterations made by Gruneberg and himself from Nehring's design; and in 1701 he completed the *Schloss*, and built the *Schloss-thor* with the *Kuppel* in the market place at Potsdam etc.'

So much can be read on Jean de Bodt in the Architectural Publications Society's *Dictionary of Architecture*,[1] Thieme-Becker's celebrated *Künstlerlexikon* has even less, though it does add that Bodt exchanged Dresden for Berlin in 1728, was made Quartermaster General in 1741 and died in 1745 at Dresden. Mr. Colvin does not mention him at all, though he does mention, e.g. Pierre Pouget, another Frenchman working for a short while in England.[2] Nor is he mentioned in Sir John Summerson's volume of the Pelican History of Art or in Dr. Whinney and Mr. Millar's volume of the Oxford History of English Art. The fact that he designed Wentworth Castle in the West Riding of Yorkshire for Lord Raby about 1710 has no better authority than a letter written in 1756 by Horace Walpole, but is borne out by style as well as by Lord Raby's presence in Berlin as British ambassador from 1703 to 1711. There is no reason to assume that Bodt travelled to England for Wentworth Castle. He may just as well have supplied the design from Berlin.

Of his recorded sojourn in England nothing had as yet been found out when Professor Heinz Ladendorf, then of Leipzig in East Germany and now of Cologne in West, started research as an undergraduate in 1932. While writing his book on Schlüter he also worked on a biography of Bodt, assembled a great deal of material and then gave up his project, partly because the most valuable documents he had by then read and extracted

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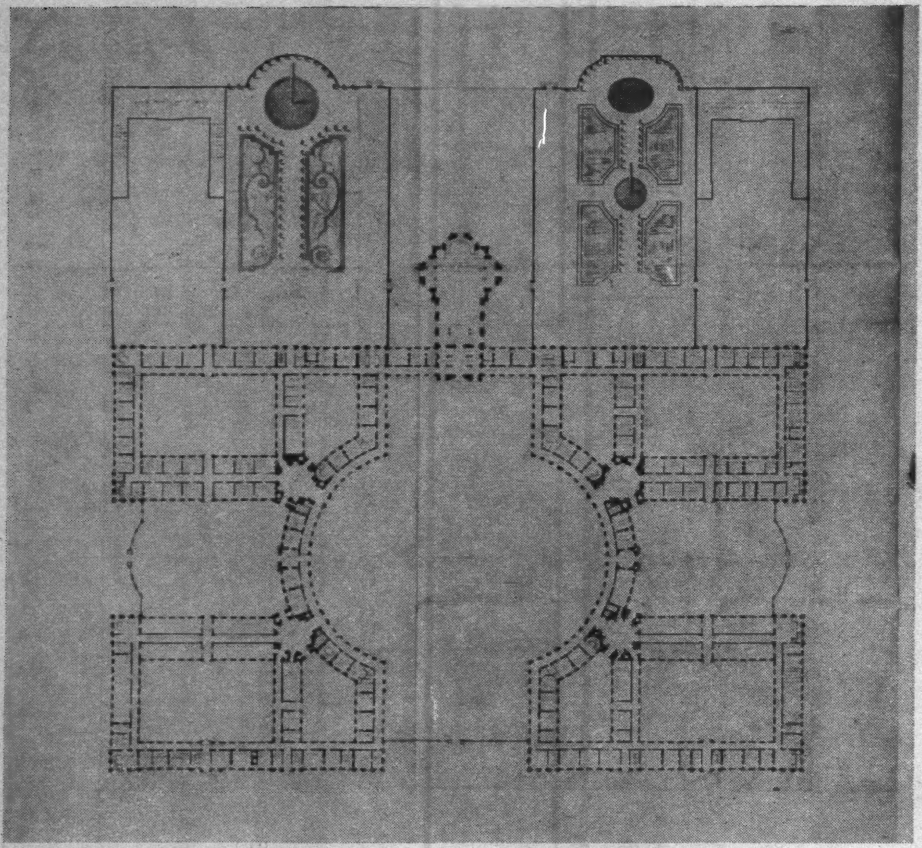
[1] Vol. I., p. 99, no date.

[2] But Daniel Marot again is not mentioned who was also French and also served King William as an architect in England. He spent the years 1695-98 in this country, *see* M. D. Ozinga: *Daniel Marot*, Amsterdam, 1938, p. 89, etc.



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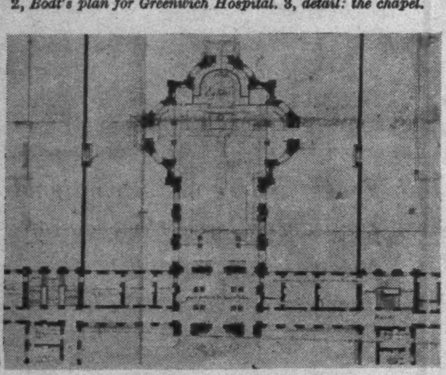

3

2, *Bodt's plan for Greenwich Hospital.* 3, *detail: the chapel.*

were burnt in the air attack on Dresden of February, 1945, or disappeared after it, and partly in connection with his flight through the iron curtain. He very kindly deposited all his material with me, giving me permission to edit for THE ARCHITECTURAL REVIEW what might be of special interest to this country. His findings concern both Bodt's life and work.

As for his life, Professor Ladendorf got hold of a more detailed story sent by Bodt's son-in-law, M. de Wangelin on July 24, 1781, probably to Erman & Reclam who published it in *Mémoires pour servir à l'histoire des réfugiés français*, vol. VII, 1790, p. 244, etc. According to this Bodt's family had been 'distinguée et opulente.' His father died when he was only two years old. His mother remarried, and her husband, M. d'Usez, was a Catholic. In spite of this he was brought up a Protestant. He was interested in mathematics and architecture, and 'M. Blondel le prit en affection.' He got a prize at the Royal Academy of Architecture at the age of fourteen, but went to Holland the next year—that would be in 1685—and became Captain of Artillery in England in 1690. Apart from his salary he received a pension of 100 guineas for services in Ireland. He served at the Boyne, at Antrim, Steenkerque and Nerwinde and was Chef de Brigade at Namur. In 1699 he joined the service of King Frederick I of Prussia and was made Brigadier and Premier Ingénieur in 1704.

This record is not perfectly accurate, as we shall see. The published records of the Académie Royale d'Architecture have nothing about a prize given to Bodt in or about 1684. Concerning his later career in Germany, he was made Colonel in 1706, Brigadier in 1712[3], Lieutenant General in Dresden in 1728 and General in 1741. The combination of civil architecture with a military career was nothing unusual in Baroque Europe and especially Germany. Balthasar Neumann came from the artillery and became Colonel, Welsch was general, so was Lucas von Hildebrandt.

Professor Ladendorf, in the course of his work, succeeded in supplementing Erman's printed life from an unprinted one written by Bodt's great-granddaughter Adolfine von dem Knesebeck, née von Klitzing, and communicated to Professor Ladendorf by Regierungsbaumeister Neumann of Neuruppin. According to this, Bodt's ancestors lived in Mecklenburg. His father travelled in Italy and France, met Mlle Rose Louvent de Veral of the house of Rieux in 1645, sold his property in Mecklenburg and settled down in France. They were married in 1669. The son, born in 1670, went to Holland in January, 1685. At the Hague he managed at once to be introduced to William of Orange and became Comptrolleur Général and Conducteur of dams. Later he was engineer of the Tower. When he returned from Ireland and Flanders he made plans for Whitehall Palace, and these were seen by Frederick I who thereupon obtained permission from William III to have Bodt in Berlin. He married in Berlin a young woman called Jeanne de Persode. Their daughter married Freiherr von Wangelin and their granddaughter General von Klitzing.

This story, again, is not entirely correct. For instance, it is highly unlikely that Bodt was made Controller of Dams in Holland at the age of sixteen or seventeen. As for the facts referring to his English phase, they will now have to engage our attention.

Some research undertaken at the Public Record Office to augment what Professor Ladendorf had found resulted in much detail on Bodt's military, but, alas, none on his architectural, career. William had landed in November, 1688. James II fought on in Ireland. The battle of the Boyne was on July 1, 1690. The war was at an end in October, 1691. In 1690 the French fleet had burned Teignmouth. In Spring, 1691, William crossed to Flanders. The French defeat of La Hogue was in 1692, the capture of Namur in 1695, the peace of Ryswyck in 1697. John Bodt—for thus his name always appears even in his own signatures, the 'de' being perhaps a later self-bestowed eponym—appears in 1690–1 in the Artillery Train in Ireland as an engineer at 7s. 6d. a day.[4] On April 1, 1692, he was appointed an engineer to the Artillery Train for Flanders at 10s. a day.[5] On February 28, 1694, a warrant was issued on his behalf to pay him an allowance 'to enable him to perfect himself in the art of engineering.'[6] This allowance was £100 a year payable in debentures.[7] On September 1, 1694, he was commissioned as Brevet-Captain.[8] This allowance continued independent of the fact that late in 1695 and in 1696 and 1697 all officers of the artillery

[*continued on page* 33

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[3] Archiv des Geheimen Kriegsrats, Berlin. The documents were seen by Professor Ladendorf.

[4] Chas. Dalton: *English Army Lists*, London, 1896, vol. III, p. 184.

[5] P.R.O., W.O. 55/482, p. 19.

[6] Cat. of State Papers Domestic.

[7] P.R.O. Rolls of the Paymasters of the Ordnance, also W.O., 53, 1-9.

[8] Dalton, *l.c.*

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6

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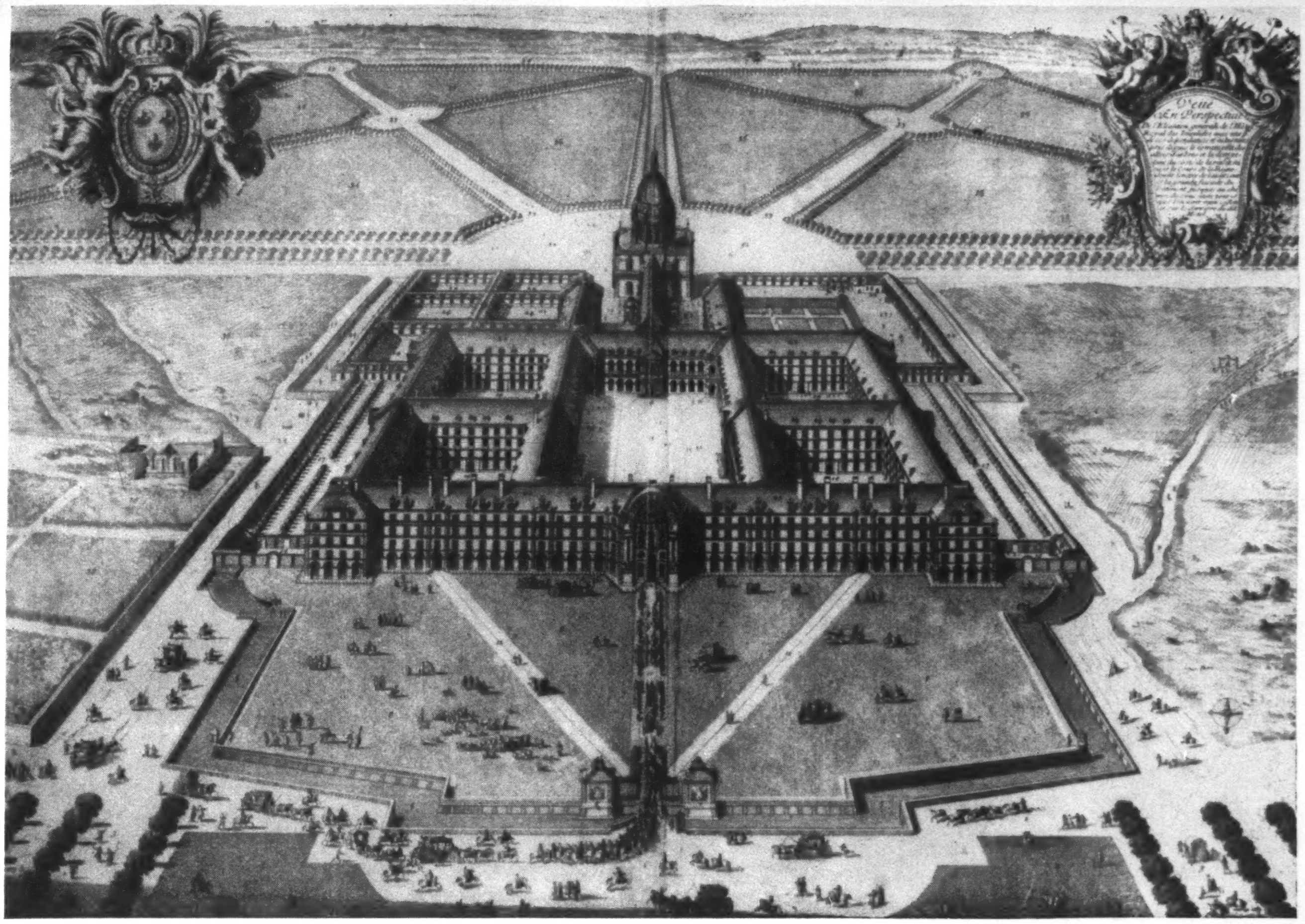
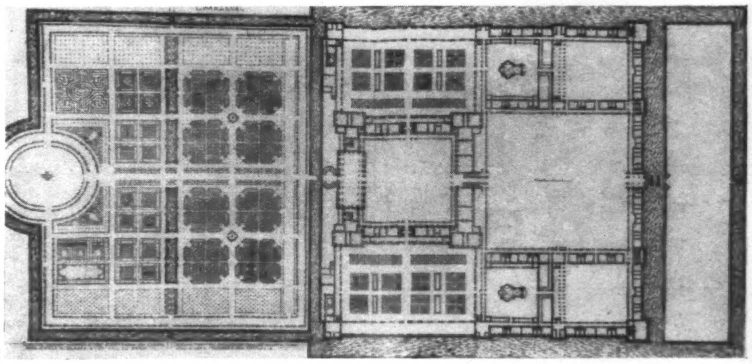


4

Three designs which influenced John Bodt's drawings of Greenwich Hospital: 4, Libéral Bruant's Maison des Invalides in Paris. 5, Inigo Jones's and John Webb's plan for Whitehall Palace. 6, Ducerceaux's proposed palace for Charles IX at Charleval.



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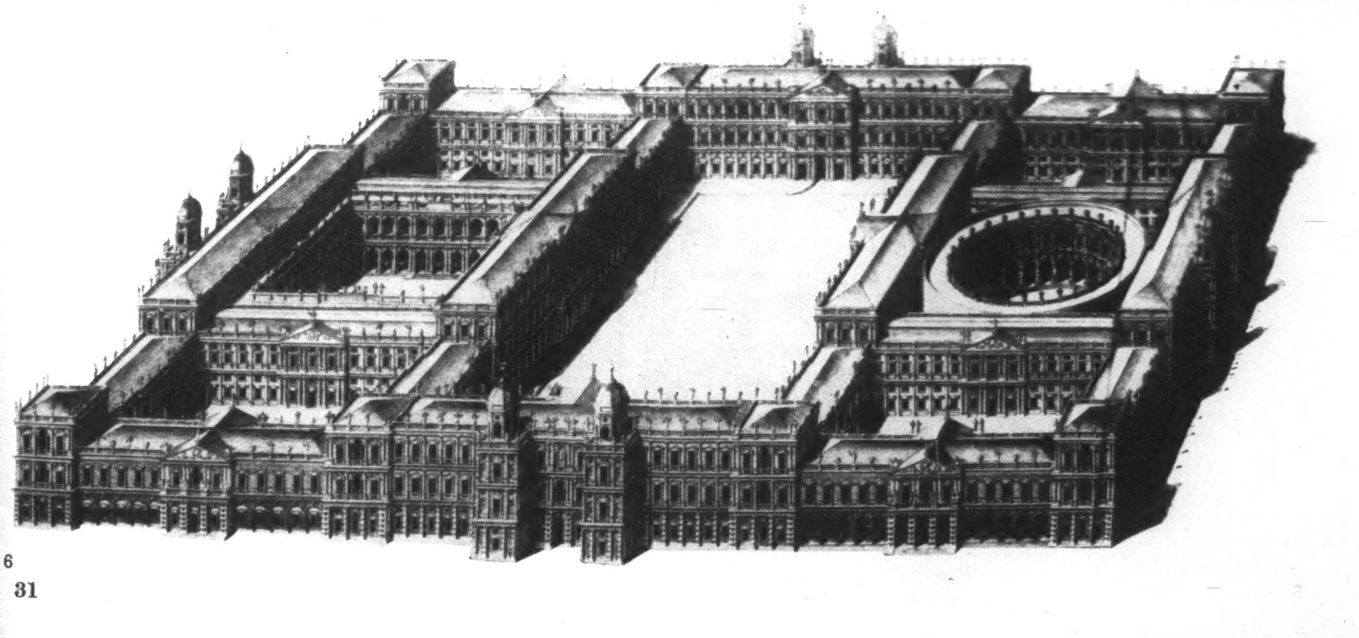

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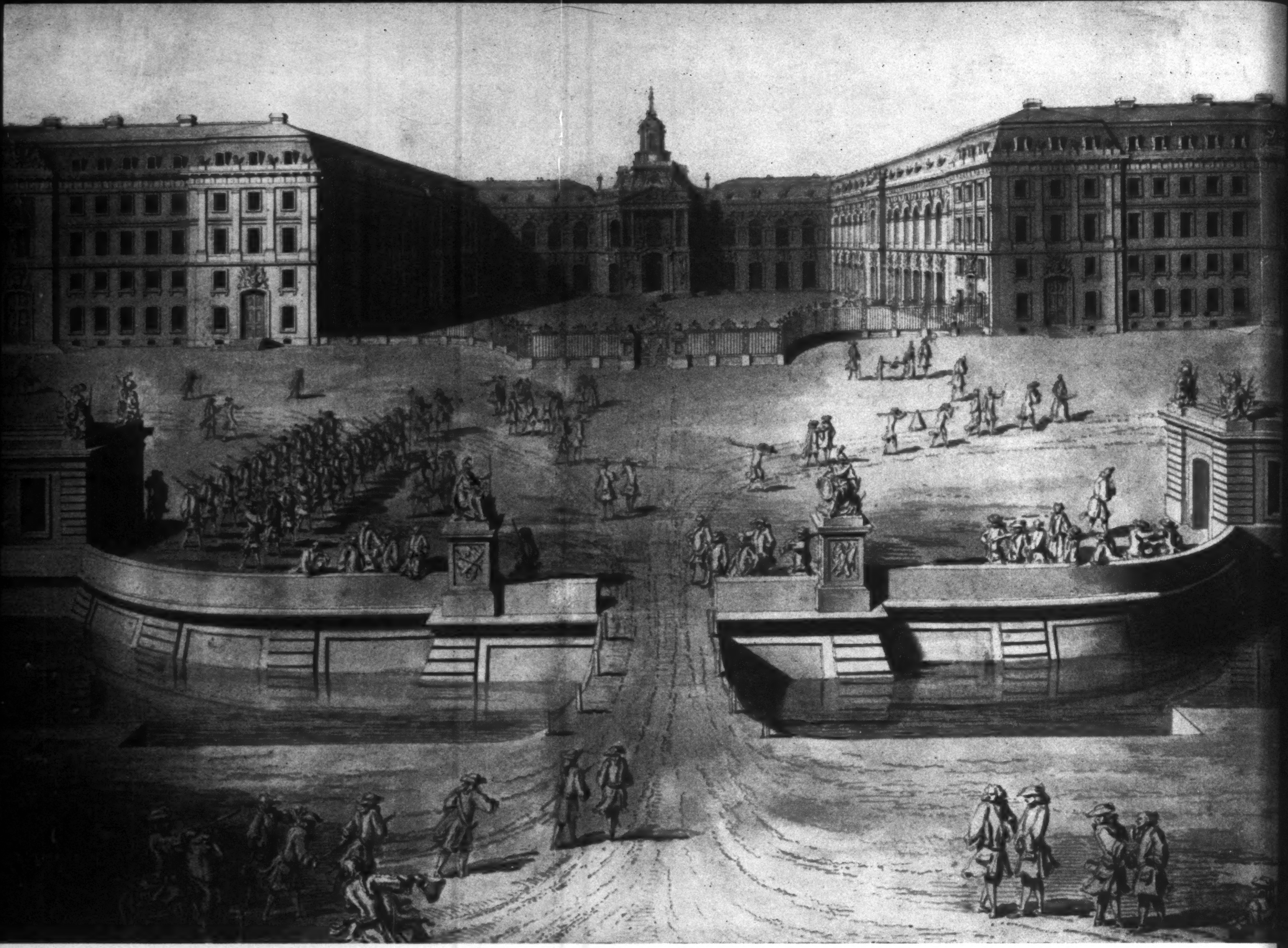

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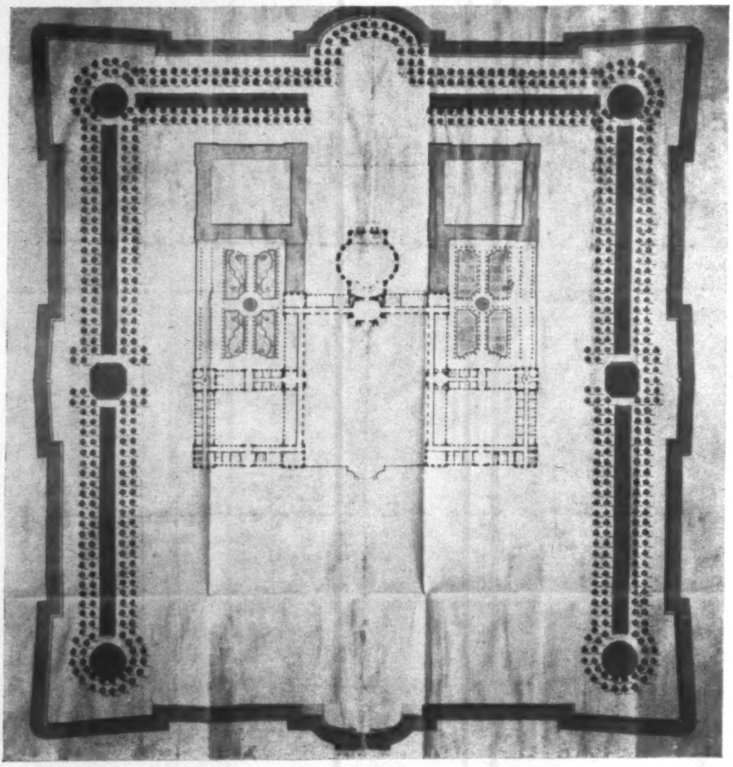
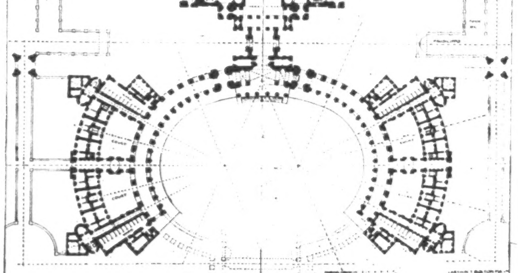
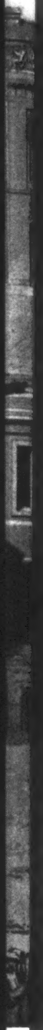


8

7 and 8, perspective and plan by John Bodt for Hospital for Frederick I (1702). 9, *proposed plan for Greenwich Hospital, attributed to Hawksmoor.*


CHAPEL
COURT
COURT
QUEEN MARY BLOCK
KING WILLIAM BLOCK

9



continued from page 30]

in Flanders were on three-quarters pay, probably because the fighting was over. For his services at Namur he received a 'gratuity' of £50,[9] but it is not quite certain what that really represented to him; for his pay was in arrears by—it says in a memorandum of June 14, 1697—'several years'.[10] The same memorandum mentions that he was doing work 'at several places on the canal' which involved travelling expenses.

In October, 1697, the Artillery Train apparently returned to England. Bodt's wages had always been paid in gulders, but on December 22, 1697, they were paid in £ s. d. On the same day an order was issued to pay Bodt and many others their full arrears. The money finally reached him in March, 1698.[11] The Flanders Train, however, was not disbanded and Bodt's services were retained.[12] His payments go on in the rolls of the Paymasters of the Ordnance. They came to an end on September 30, 1699. So by then he will have left London and gone to Berlin.

His financial position was not the best; for there is a letter of August 8 to the Board of Ordnance[13] referring to 'the disorder his affairs are in, occasioned by his wife.' We know nothing about this first wife, except—and here we are returning to Professor Ladendorf's research—by a letter from the King of Prussia to Spanheim, the Prussian Ambassador in London, of May 13, 1704, which mentions her name, Elizabeth Temerly, and discloses the fact that Cap. de Bodt is petitioning *in puncto divortii*. The King says that he cannot release Bodt to go to London and plead his own case. Would Spanheim see to it that nothing is decided in London. The case ought to come up in Berlin. Another letter, of March 29, 1704, mentions the fact that she asks for money for their child, to which he answers that for years he had wanted separation, that he does not recognize the child as his, that she has, ever since their wedding, 'entretenue un infame commerce de paillardiste avec des particuliers,' and that she leads a 'vie libertine et débauchée.[14] Bodt must have succeeded in getting rid of this undesirable companion of his twenties; for we have seen that he married again in Germany.

The only connection of Bodt with English architecture which has so far come out of all this is the reference to designs for Whitehall which the *Dictionary of Architecture* makes and which is borne out, e.g. by Heinecken's *Nachrichten von Künstlern*, Leipzig 1768, where it is said that he brought these designs (or no doubt copies of them) to Dresden. There were indeed in the Sächsische Landesbibliothek at Dresden seven volumes of drawings which had been in the possession of Bodt. One portfolio dealt with designs for the cathedral of Berlin, one with the Schloss of Potsdam, one with barracks, one with churches, two with houses, one with triumphal arches and two with war machinery. That leaves yet one more, and to this I shall have to revert a little later. The present whereabouts of all these drawings cannot be ascertained, but fortunately Professor Ladendorf had studied them all and had also had many of them photographed. Bodt must have valued the Whitehall drawings specially highly; for in a note on his former belongings at Dresden[15] it says that he gave their value as 200 pistols. Unfortunately, however, Professor Ladendorf could not discover any of them, though there were a number of plans and elevations for unnamed palaces. Bodt probably did his designs not after the fire of 1691, as the *Dictionary of Architecture* says, but after the more damaging one of 1698. The latter date is more likely, as Bodt was in London and free from military duties in that year and the early part of the next, whereas in 1691 he was in Ireland and in 1692 in Flanders—aged then only twenty-one and twenty-two. So these unknown drawings of Bodt's were done in competition with Wren's grand and Baroque ones, and one would like to know under what terms of reference. Wren was Surveyor General, Bodt was just a Captain of Artillery. Perhaps one can assume that King William really knew and liked him and so had made it possible for him at least to put forward his ideas.

If only we knew them. However, we know of ideas of his for another, *the* other, major royal building of these years; for among the Dresden drawings there were three[16] called 'Plan d'une maison des Invalides pour le Roy Guillaume,' 'Elévation de la même Maison' and 'Perspective de la même.' These are reproduced as illustrations 1–3. They cannot refer to Chelsea which was complete by 1691, but they can—only just—refer to Greenwich. It is true that Wren had been asked in May, 1695, by the Grand Committee to design the new buildings, and that building started in 1696 and went forward briskly.

As for Bodt's designs, there are only three possibilities. They were made for another Maison des Invalides projected by William, which is not likely. Or they were made for Greenwich by one who did not know how much of the final designing had already been done when building started, which is also unlikely, or they were done for the King about 1694–5 while Bodt was in Flanders. This last suggestion is perhaps the most probable, as the drawings do not take the site at Greenwich into consideration. In the portfolio where they were kept in Dresden they were followed immediately by the plans 'pour une Maison des Invalides pour M. le Roy de Prusse.' This proximity may explain how the Greenwich drawings were preserved in the first place. However, Bodt's plans for this Chelsea for Berlin were indeed done, 'pour le roi de Prusse,' i.e. remained unexecuted. The Prussian Maison des Invalides or Invalidenhaus was built only in 1748.

The Greenwich drawings are entirely French in their sources. There is nothing English or Dutch about them. Their immediate pattern is the engraving (illustration 4) of Libéral Bruant's Maison des Invalides in Paris, begun in 1671 and completed in 1676 except for Hardouin-Mansart's church of St. Louis des Invalides begun in 1679 and not completed until 1691. Bruant has not only the arrangement of a large centre forecourt with symmetrically arranged side courtyards, but also the church projecting beyond the rectangle of the rest and even the very unusual semicircle instead of a pediment in the frontispiece—in Bruant's case of the gatehouse, in Bodt's of the church. The courtyard with the curved side is an addition of Bodt's, inspired perhaps by the circular courtyard in such Whitehall drawings of Inigo Jones and John Webb as 5, or by Vignola's circular courtyard at Caprarola or indeed the Piazza of St. Peter's in Rome. The trefoil at the chancel end of an aisleless chapel on the other hand is again a direct borrowing from France. Ducerceau had planned two such chapels in side courts of Charleval, 6, the majestic palace projected for Charles IX.

The Hospital for Frederick I, dated 1702, 7 and 8, was a little smaller in size, but equally French in its motifs such as the upper giant pilasters, the trophies and the mansard roofs, and there was in the same portfolio at Dresden a variant design, much smaller but with the plan of the church on the pattern of the Greenwich plan, and yet another, apparently without plans, where the semicircle of the church entrance at Greenwich is taken over and combined with a French pavilion roof. All these belong rather to Bodt's Prussian than to his English phase and do not further concern us here, especially as they show little similarity with Wentworth Castle. The Zeughaus or Arsenal in Berlin, Bodt's principal job there, offers more welcome comparisons, but on Wentworth Castle and its position and history a separate note is needed, and this has been written by Mr. John Harris and is appended here. What, however, ought to be mentioned at least for a moment before the Greenwich designs are taken leave of, is the curious similarity between Bodt's centre courtyard, with its curved sides and the chapel at the far end, and the designs for Greenwich, 9, first illustrated in volume VI of the Wren Society and attributed to Vanbrugh and the year 1702 and recently discussed again by Mr. Downes[17] with an attribution to Hawksmoor and a suggested date of 1711 or a little later. Must one assume that Hawksmoor had access to Bodt's scheme, or can the recurrence of the motif be accidental?

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[9] W.O. 51/55.

[10] W.O. 53/1-9.

[11] W.O. 53/1-9.

[12] W.O. 46, 4, pp. 20-24.

[13] W.O. 46, 4, p. 55.

[14] Preuss. Geh. Staatsarchiv, Rep. 47, 9, MA 112; Ehescheidungs-Dispensionen, 1697-1713.

[15] *Catalogue des Livres d'Architecture etc.* XVIII. Jh., c 68.

[16] Staatsbibliothek, Archit. 271. Professor Ladendorf mentioned their existence in his *Andreas Schlüter*, Berlin, 1935, p. 55 and Dr. E. Sekler, *Wren and his place in European Architecture*, London, 1956, p. 191, referred to them as extant, but, of course, could know nothing about them. He pleaded, however, for an influence of Wren on a church design by Bodt dateable to after 1713 and illustrated it on pl. 79.

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[17] K. Downes: *Hawksmoor*, London, 1959, p. 91, etc.

JOHN HARRIS

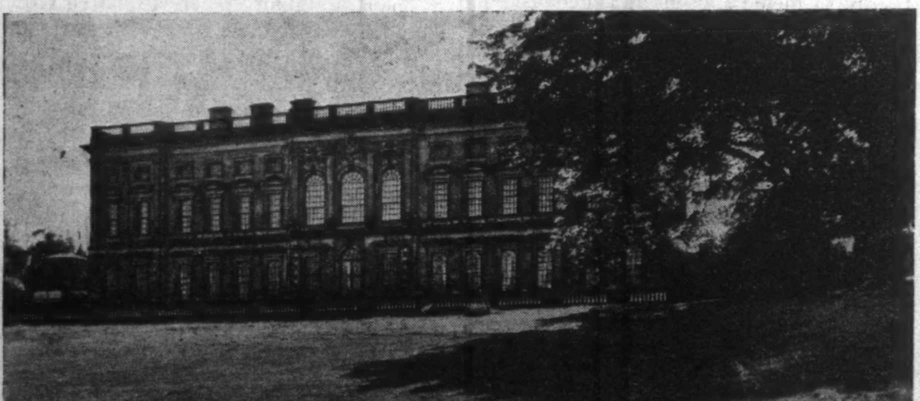
BODT AND STAINBOROUGH

The seventeenth-century house at Stainborough (now Wentworth Castle) had been a moderate stone-quoined brick affair built about 1670 around an earlier core.[1] Henry Cutler sold this estate in 1708 to Thomas Wentworth, Lord Raby, for £14,000; the reasons for Raby's purchase being twofold: the need for a large estate to support his aspirations for a peerage; and a desire to be in show-off proximity to Wentworth Castle (now Wentworth Woodhouse), the seat of his nephew Thomas Watson-Wentworth who had been bequeathed the house by the 2nd Earl of Strafford in preference to Raby, though Raby was really the head of the family.

Raby must have begun his new wing, 10, as soon as purchase was complete; for in a letter of March 15, 1709, Peter Wentworth says, 'A visit to Lady Bathurst, where I mett my mother and she desire I wou'd show your Plans. She stood amazed at it, and said the least such a building cou'd cost inside and out wou'd be ten thousand pounds . . . we wish you mony enough to finish such another wing, and long to enjoy it. . . .'[2] It is doubtful that more than the foundations had been laid for in February, 1710, the question of a stone or brick house had yet to be decided. Raby says, 'I am going on as hard as I can drive with my building and am at last persuaded to make it of brick and stone as Hampton Court is and wch I am assured will look better than all stone.'[3] This decision must soon have been reversed. The letter just quoted was written from Berlin where Raby was Ambassador to the Court of the King of Prussia, and it was from Jean de Bodt, the King's architect, that Raby acquired the designs for his house. Bodt's identity in this respect was first revealed by Horace Walpole in a letter to Richard Bentley of August, 1756, describing the new east wing as 'a pompous front screening an old house; it was built by the last Lord, on a design of the Prussian architect Bott . . . the only pair of stairs is engrossed entirely by a gallery of 180 feet on the plan of that of the Colonna Palace at Rome. . . .'[4]

Bodt's designs have lain for long, not unnoticed, but unidentified, in the Victoria and Albert Museum[5] and, although not signed, can be verified by comparison with Bodt's documented designs. The provenance of these drawings is somewhat complicated; for the drawing of the façade, 11, was acquired in 1890 and the two sections, 12 and 13, in 1937 as part of a volume of drawings mostly by John Talman and his Italian draughtsmen. The elevation is inscribed in Bodt's hand in French, 'Elevation de la facade du Batiment neuf' and in a different hand, 'W.T. del et inv.' The transverse section is inscribed 'One end of a Gallery' and 'J Talman' and the longitudinal section, 'Coll J. Talman.' These inscriptions have caused scholars to attribute the design to William Talman—an attribution justifiable from the evidence but not on grounds of style. The volume containing the sections came from the collection of Francis St. John of Thorpe Hall, outside Peterborough, and is inscribed by St. John, 'Bt at M Talman's Sale feb 2d 1725/26 £7 .10'.[6] St. John would in any case have been close to John Talman, as his daughter married Giacomo Grisoni, one of Talman's draughtsmen. It is surprising to find designs for Stainborough in the Talman Collection only a year or so after the house had been completed, and the only explanation seems to be that there had been an earlier Talman connection with the house. A further Talman link is the similarity of the bay plan of the elevation to an unexecuted project by William Talman for Castle Howard of c. 1698.[7] Unless this is a coincidence it suggests that Bodt had access to Talman's designs. This is, of course, quite possible, as in any case we know now that Bodt was in England in 1698 and engaged on architectural pursuits. Perhaps Talman was first commissioned for Stainborough, worked up an old plan for Castle Howard and fell out with Raby who passed his plans on to Bodt. Or perhaps, as Bodt was in Berlin in 1708, the need for an executant architect arose and Talman was chosen for this task.[8]

Whatever may have been the state of affairs in 1708, by 1709 Raby was directing his own building operations by letter from Berlin and this had repercussions among his friends. Peter Wentworth says, on the 22 May 1711, 'When I was at the Duke of Shrewsbury's my Lord Scarborough was there and he was talking of his building, and they did agree there was no building



10, *Stainborough (now Wentworth Castle) as built, showing alterations to Bodt's original design.*

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[1] Discussed in *Country Life*, October 18, 25, 1924.

[2] Peter Wentworth, Lord Raby's brother. Cartwright, J. J. *The Wentworth Papers*, 1883, p. 79.

[3] British Museum, Strafford Papers 22229, f. 91.

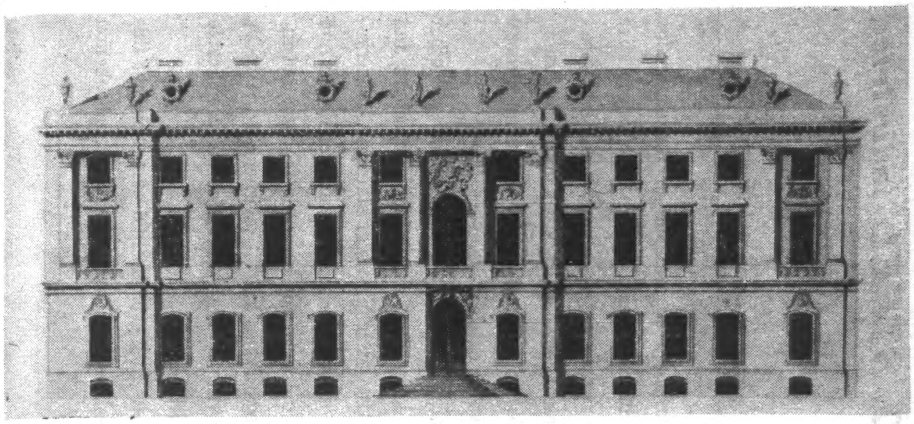
[4] Letters of Horace Walpole, ed. P. Cunningham, 1857, vol. III, p. 28.

[5] V. & A. D. 212,1890 and (Album) 92. D. 46.

[6] An undocumented sale before John Talman's death in November, 1726.

[7] RIBA Library, cf. Whistler, L., *The Imagination of Vanbrugh And His Fellow Artists*, 1954, p. 32.

[8] Talman was possibly the most cosmopolitan minded of the later seventeenth century architects. He almost certainly knew Daniel Marot.



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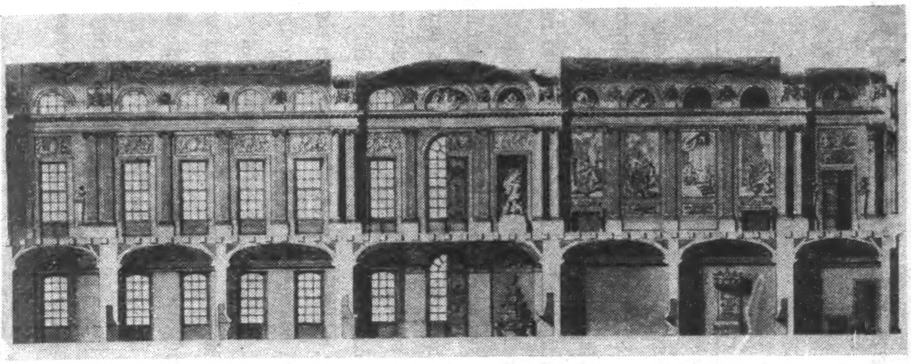
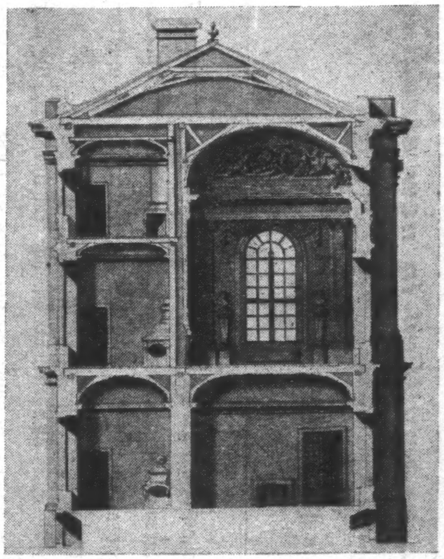


12

11, *John Bodt's original elevation for Stainborough.* 12, *longitudinal section.* 13, *cross section.*

without a Surveyor, even when they agreed by the great, Wch agrees with the advice Mr Benson is always desiring to send you word, you must be at the expense wch in the main will be mony saved, for a blunder in building is not to be repaired without a great expense and loss of time and labour.'[9] The mention of Robert Benson is significant; for at this time he was building his own house at Bramham with Thomas Archer as his architect. As early as April, 1709, it had been suggested that Benson look after Raby's building. Probably Archer was indeed sent over from Bramham; for Raby wrote to him from The Hague on April 17, 1714, 'Upon what you told me at Windsor, I sent to Mr London, and had he not died as he did I had certainly got the plan of my gallery at Stainborough but not having nobody at London, that knows it unless youll be so kind one day as you go to the Park through Spring Gardens to call upon his widow, and look over his plans, to find that of my gallery.'[10] There is no reason to suppose that George London was an architect as well as the King's Gardener, but he was the gardener habitually employed by William Talman. Archer replied to this letter on April 20, 'As to Mr London's affairs I have promised Mr Wentworth to wait on him, if he will obtain leave from Mrs London, and to view the Drafts in order to find your Lordship's own. . . .'



13

Progress of the work cannot have been quick; for in 1713 the roof was still to be raised, as is revealed in a letter from a builder and surveyor, Edward Reeves (August 25): 'My Lord. I have considered how many yards of wainscot there will be in all ye Hall story and in ye Gallory only at Stainborough. . . . They have got up all the great beams in Yorkshire and will soon be ready to set ye cornish and raise ye Roof. Therefore could wish I was there to see if the windows would do to stand in ye wall to Light those rooms behind ye Gallory, if not that there might be some from above before it be leaded.'[11]

Bodt's elevation conforms to the stylistic trend of early eighteenth-century Franco-Prussian architecture and of his own work. The central three bays are close to the end three bays of his unexecuted project for a palace for the Elector at Dresden[12] where the roof is suppressed behind a parapet as was eventually the case at Stainborough. Small details like the mass of relief sculpture above an arched window are favoured by Bodt; for example to the side entrances of the façade of his project for Berlin Cathedral.[13] In execution Stainborough, 10, received a more Baroque articulation and fenestration. Bodt's slight end projections were made into paired bays; the upper-floor windows were squared with lugged corners; the first floor ones were given bracketed segmental pediments; and the ground floor ones included fat waisted pilasters to the basement windows below them. It is perhaps significant that many details differ between the front as built and as shown on the earliest engraving published in 1713 and drawn by C. Holtzendorf who was secretary to the Embassy in Berlin. These final alterations could be due to Archer; for waisted pilasters in this context appear at St. Philip's, Birmingham, 1708, St. John's, Westminster, 1711, and Roehampton House, 1712.

Progress on the interior must have been slow; for on August 29, 1720, Daniel Harvey of York signed an agreement for '4 capitals after ye Corinthian order . . . to 4 marble pillars . . . in the gallery . . . of Stainborough Hall.'[14] Like Bodt, Harvey was French and perhaps also a Huguenot and is recorded as *sculptor* and *Architector peritus*.[15] None of Bodt's suggestions for the interior decoration was executed, and the interior of the gallery was considerably modified to a Palladian correctness. In 1725, Lord Bathurst comments, 'the gallery is a very magnificent room now the pillars are up.'[16]

Two other houses in Yorkshire exhibit features not alien to Stainborough: Wentworth Woodhouse, its neighbour, is said to have received its west front between 1725 and 1728 also in a Franco-German style with a centre-piece that is close in manner to Stainborough and anticipating Schlaun's and Cuvilliés's palace at Brühl (c. 1735); and Beningborough Hall dated 1716, and built for Thomas Bourchier, also Franco-German in details and with panelling identical to some at Stainborough. It is a house whose architectural history needs elucidation.

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[9] Cartwright, op. cit., pp. 199-200. Heythrop was by Archer and Lord Scarborough may have been employing Gibbs.

[10] British Museum, Add. Mss. 31, 141 ff. 1550-169.

[11] British Museum, Strafford Papers, 22241, f. 5.

[12] Pierre du Colombier, *L'Architecture française en Allemagne au XVIII siècle.* I Texte, 1956, Figs. 19, 20.

[13] Colombier, op. cit., Fig. 12.

[14] B. M. Strafford Papers, 22241, f. II.

[15] His tombstone. Drake, *Eboracum*, 1736, p. 260.

[16] Cartwright, op. cit., pp. 455-56.

the exploring eye

The Functional Tradition exemplified in new structures of the OIL AND STEEL industries

Described and photographed by Eric de Maré

Many long and esoteric works for the instruction of experts have no doubt been written about the strange technological structures of these two great industries. Here I have little to say about their technical aspects, my purpose being merely to point out, mainly by illustration, their particular visual virtues. Situated as they often are in the tufty, windy wastelands of distant coastal swamps, protected by miles of peripheral fencing and firmly guarded at their approaches by large, polite men in peaked caps, few outsiders see these structures, except such visitors as photographers on lawful commission.

The structures (buildings is hardly the right word) are highly complex in their operations and details but quite simple in their general forms and purposes. Those purposes are, in the one case, to break down crude oil into useful derivatives such as petrol or chemical fertilizer, and, in the other, to convert iron ore first into steel, and then, by rolling it, usually when hot and plastic, into sheets, joists and other solid objects. A steel works can, indeed, be regarded as a kind of huge bakery.

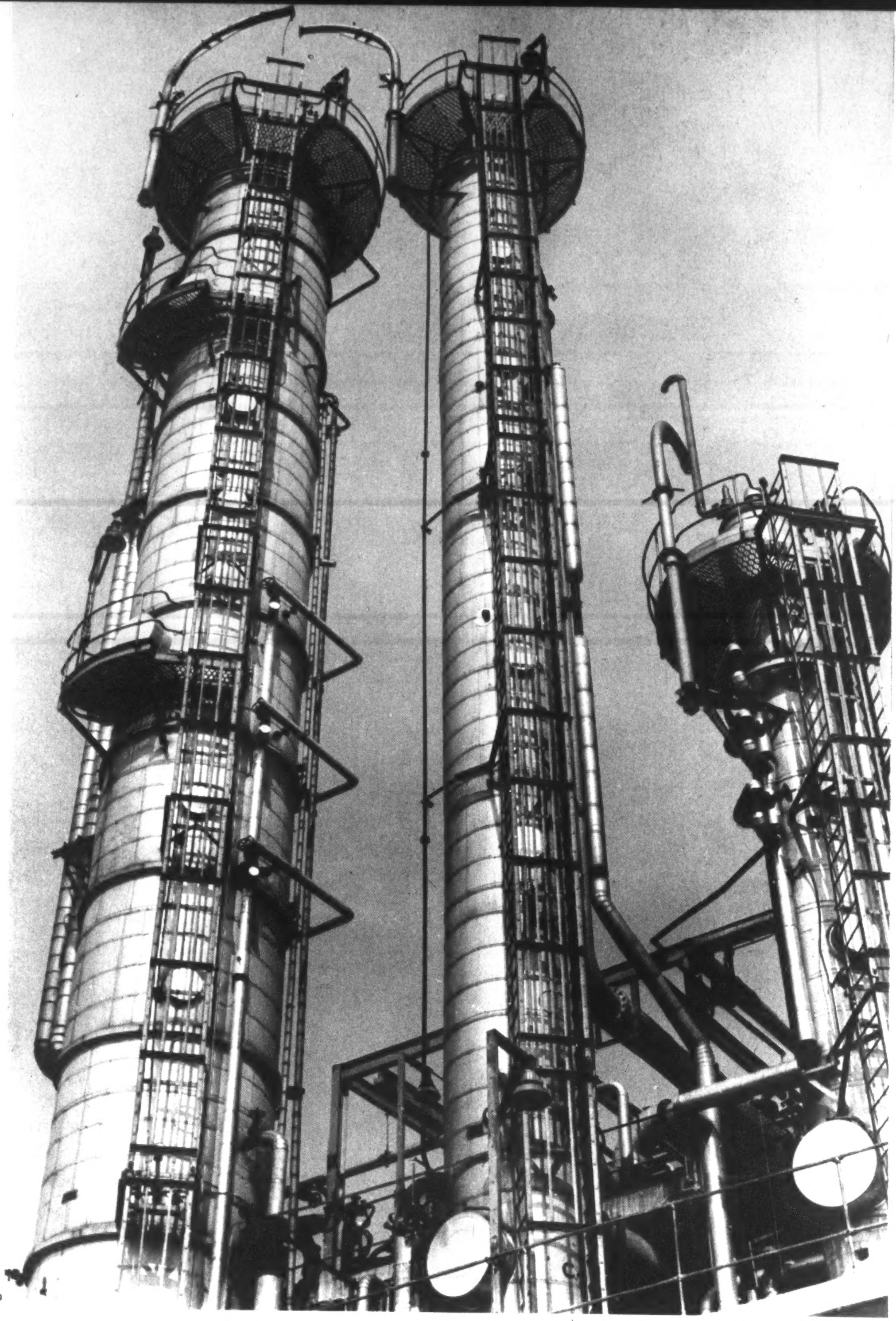
These works, built mainly of steel, aluminium alloy, concrete, brick and asbestos-cement sheet, have no conscious aesthetic pretensions or aspirations; yet they do often achieve a formal beauty, even sometimes a nobility and a grandeur, which is all their own. Perhaps one day—if any should survive the rapid advances and changes of applied science—they will be regarded as the true architectural monuments in the Machine Aesthetic of our times. They can at present be legitimately considered as examples of the continuing Functional Tradition. Even the gay paintwork of their parts, though highly decorative in effect, is purely functional in intention; for example, a pipe, among a maze of pipes, will be articulated by a specific colour to represent, beyond the possibility of confusion, the particular gas or liquid moving within it, or the brilliant zig-zag stripes on a diesel engine or swung carrier will serve as a warning to the careless eye.

With their vast, abstract compositions and silhouettes of spheres, cylinders and other forms of solid geometry, sometimes arranged in endless, dream-like perspectives and rendered bolder by contrast with their thin filigree attachments of stairs and ladders—with their glittering towers and chimneys rising up with elegant but unselfconscious and purposeful audacity from the flat and treeless landscape, and dwarfing the rare and insignificant human figure—these works, often regarded as hateful ravishers of the poet's Earth Goddess, can stir the romantic mind with visions of the wonderful and inexplicable palaces and cities of an exotic science-fiction world.

We are heirs of early industrial squalor and *ad hoc* experimental confusion, but this should no longer blind us to the clean and tidy freshness and the remarkable visual cohesion and drama of these latest artifacts of industry.

1 *(facing page), solvents distillation columns at the Shell Chemical Co.'s works, Stanlow.*

Modern Functional Tradition in the oil industry



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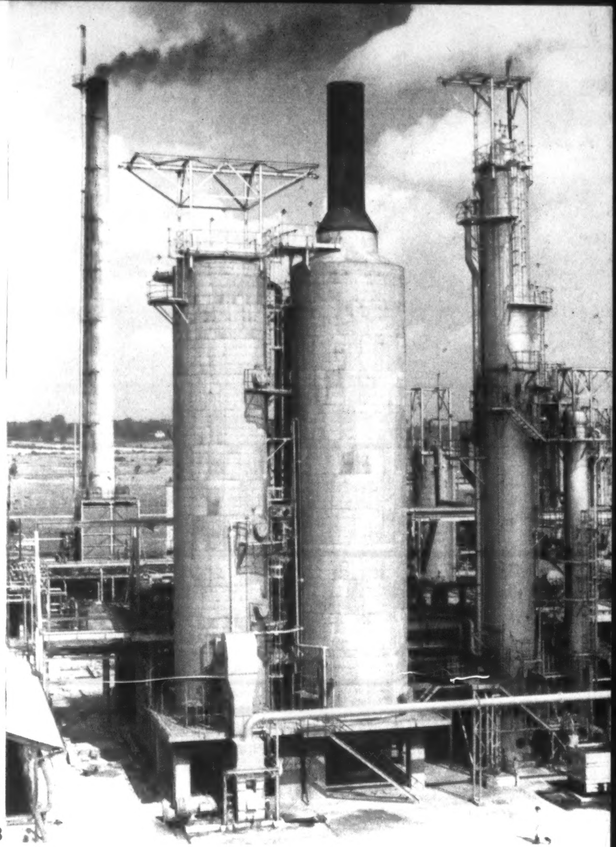

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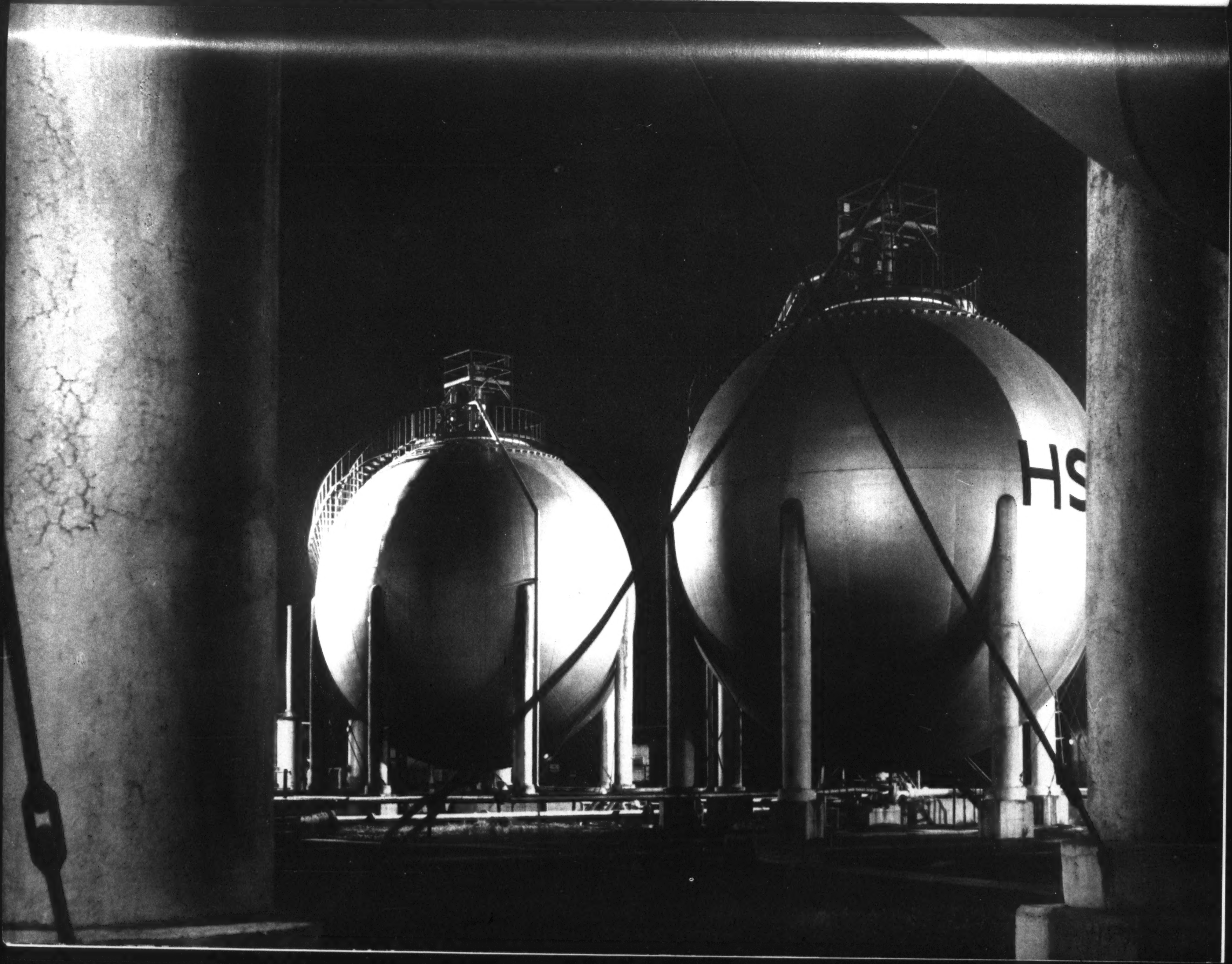
2, distillation columns of detergent alkylate plant, Shell Chemical Co., Shellhaven. 3, carbon monoxide conversion unit at the ammonia plant, Shellhaven. 4, dusk view of the propane pyrolysis furnaces and the solvents area of the Shell Chemical Co., Stanlow. 5 (facing page), Horton spheres for storage of butane gas at the British Petroleum Co.'s Kent refinery.

4



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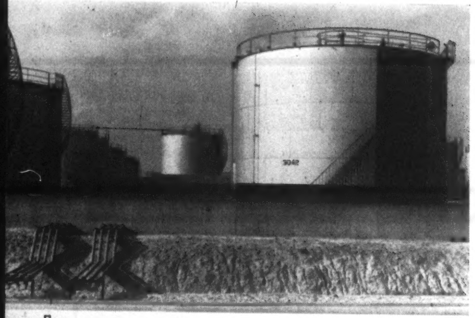
Modern Functional Tradition in the oil industry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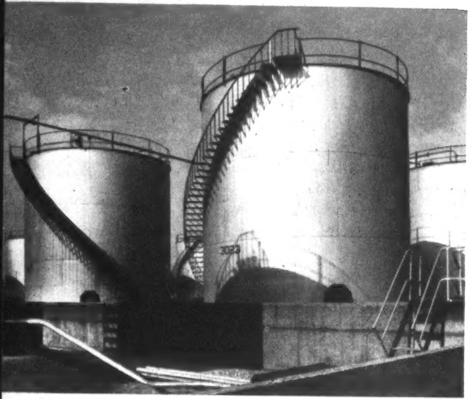
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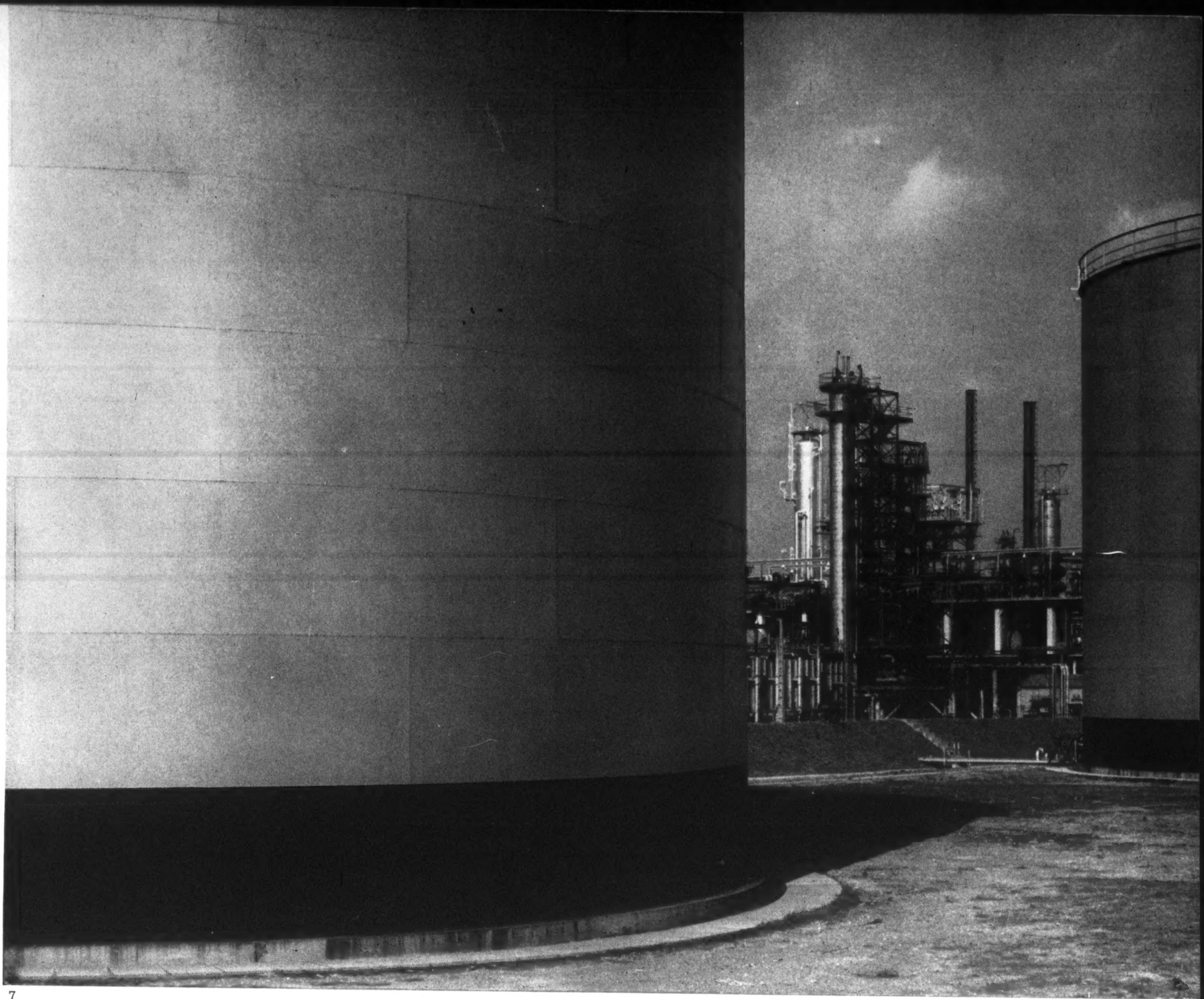
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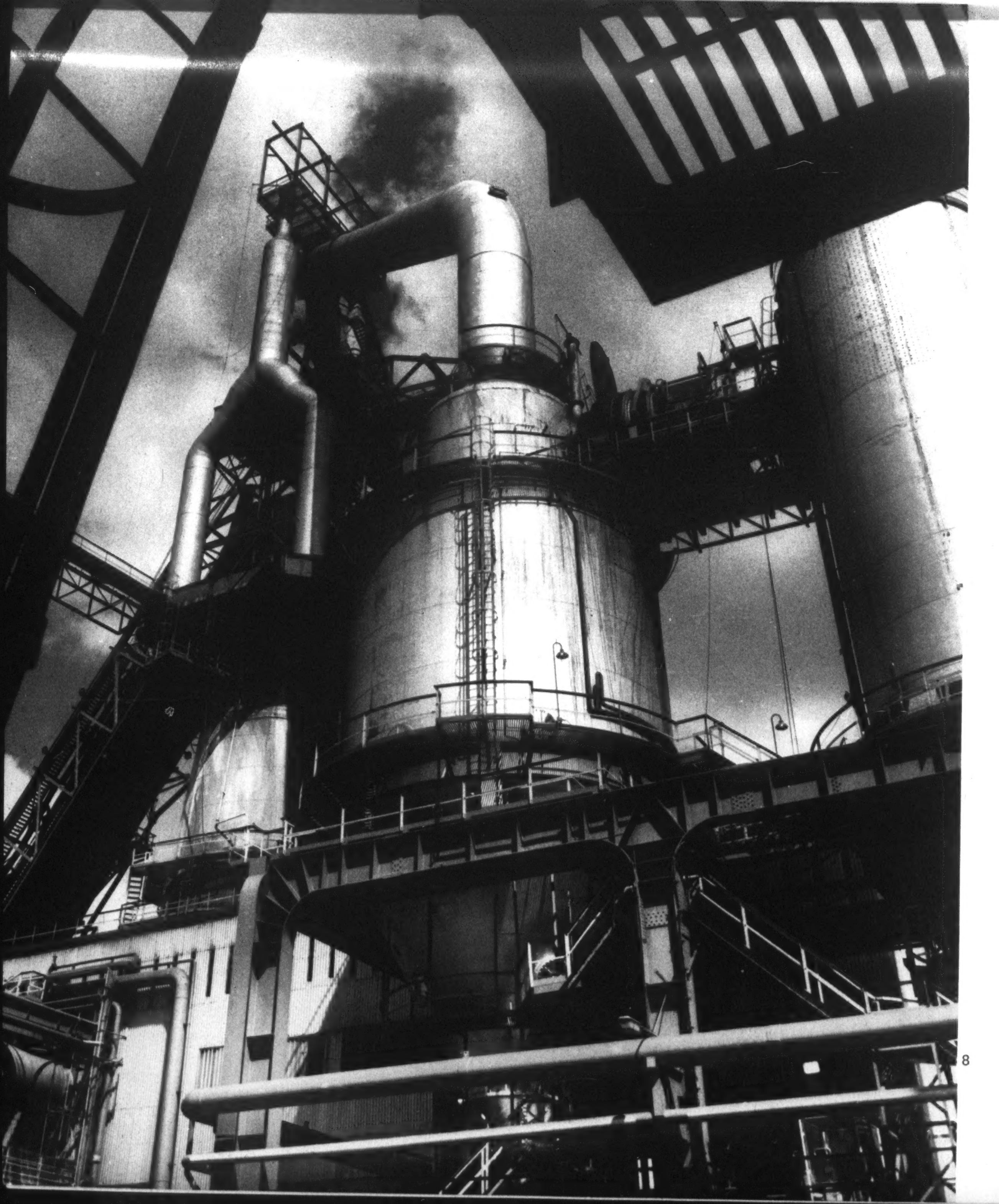
6 and 7, solvents storage tanks at the Shell Chemical Co.'s works, Stanlow. 8, distant view of oil refinery between storage tanks at Shellhaven. (The photographs on pages 37-40 are reproduced by permission of the Shell Chemical Co., The Shell Co. and the British Petroleum Co.)



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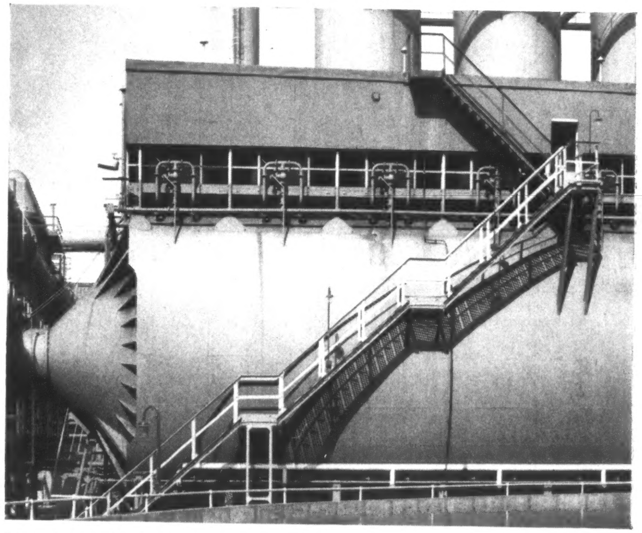
Modern Functional Tradition

in the Steel Industry



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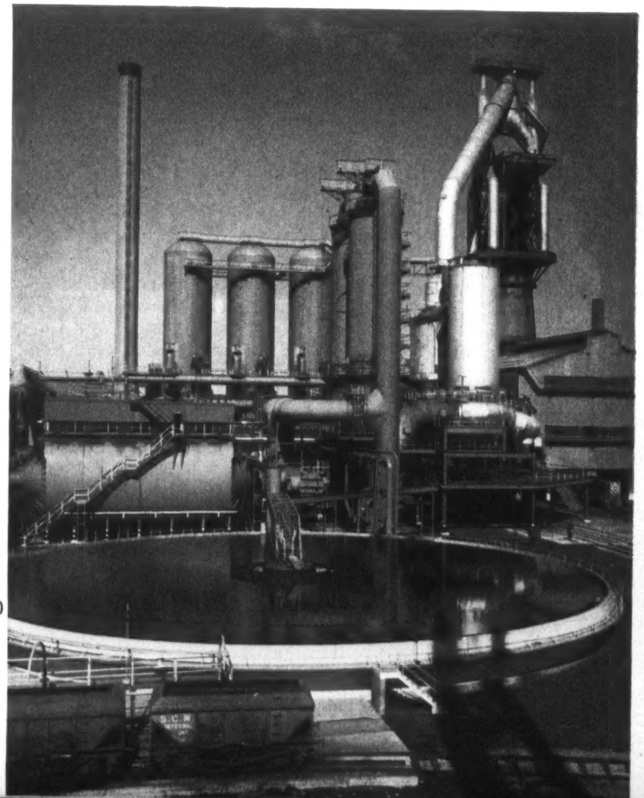
These photographs and the one overleaf were taken at the Margam and Abbey Works of the Steel Company of Wales, which are entirely devoted to the production of sheet steel, and by whose permission they are reproduced. 8, 9 and 10, the No. 5 blast furnace, one of the highest in the world, and ancillary plant.



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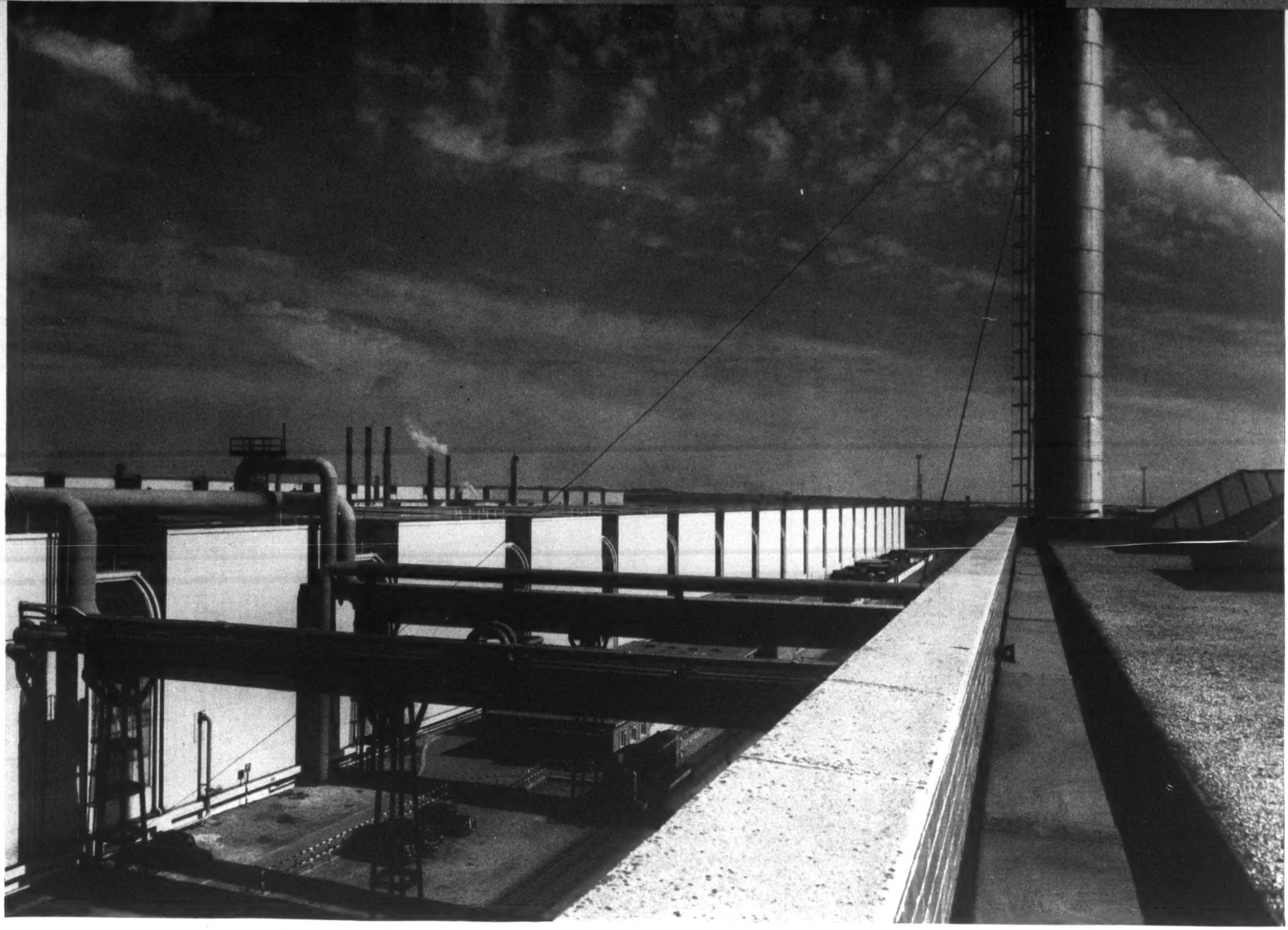


Modern Functional Tradition in the steel industry

11, *south end of the mill building, Abbey Works*

ID DR *stands this month for industrial, instead of interior, design—see explanation on right.*

The last extensive surveys of industrial design by the Architectural Review *were published ten years ago around the time of the Festival of Britain, including an essay enquiring into the progress of the newly-formed Council of Industrial Design by Nikolaus Pevsner, and a critique of the designs selected for the Festival, both in December* 1951. *Any reader looking back at these articles today will be struck by the apparent calm and certainty with which judgment was passed on individual products, a situation bespeaking settled and widely-held standards such as conspicuously do not exist today, when different sections of 'informed opinion' (who were allies and firm friends ten years ago) not only differ in their judgments on individual products, but differ even more fundamentally on methods of criticism. The article which follows examines the position of the architect in these changed circumstances accompanied by a marginal chronicle of the new men and new concepts that have emerged in the decade just past, the coincidence of the IUA Congress with the tenth anniversary of the Festival providing a compelling occasion for their review.*

Reyner Banham

DESIGN BY CHOICE

It is said that Industrial Design has altered out of recognition in the last ten years. Alternatively, it is said that only fashions have changed, and that Industrial Design is what it always was. It would be as well, therefore, to start by setting out what is unchanged, and what has been transformed. Firstly, the *subject matter* of Industrial Design has not changed; it is still concerned with (*a*) quality (materials and workmanship); (*b*) performance (functional and human) and (*c*) style (of appearance and use). Secondly, the *problem* of Industrial Design has not changed; it is still a problem of affluent democracy, where the purchasing power of the masses is in conflict with the preferences of the élite. In a subsistence economy there is no problem (though progressive Indians are just beginning to be aware of it) and in a controlled society there is no problem—a couple of jovial interruptions, larded with Ukrainian proverbs, at the relevant annual congress will put things right.

But, in the affluent democracies where the problem exists, the whole manner of squaring up to the subject matter of Industrial Design has changed, because the foundation stone of the previous intellectual structure of Design Theory has crumbled—there is no longer universal acceptance of Architecture as the universal analogy of design. When the Modern Movement was young, there were obvious and valid reasons for giving architects hegemony over the training of designers and the formulation of theory: architects alone of arts men had any technical training even remotely applicable to product design; alone of tech-men they had a sufficiently liberal education to be able to relate their designs to the general environment of human life; they alone had been doing anything consciously to further the practice and theory of Industrial Design.

Almost everything of interest written, said or done in this field between 1900 and 1930 is the work of an architect or someone closely connected with architecture—Voysey, Lethaby, Muthesius, Gropius, Wright, Le Corbusier, Moholy-Nagy, all heirs of the polymath attitude of the Morris/Webb circle of the previous century. In the next twenty years to 1950 the architectural claim was accepted by writers like Edgar Kaufmann and Herbert Read as the natural basis for argument—the latter announcing in his *Art and Industry* of 1934 'I have no other desire in this book than to support and propagate the ideals . . . expressed by Doctor Gropius.' The only novelty of even apparent consequence in this line of thought did not appear until 1954, when G. C. Argan, at that year's *Triennale* Congress proposed that urbanism, rather than architecture, should be at the head of the design hierarchy.

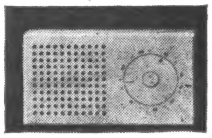
But even at that date, alternative estimates of the nature and principles of Industrial Design had begun to appear. Paradoxically, while most of these favoured the kind of design associated with the architectural dispensation—spare, neat, unadorned, etc.—they defended it by arguments that could equally well have been used to favour completely different styles of design. The classic instance is Hayakawa's essay, memorably entitled *Your Car Reveals your Sex Fears*, which assailed Detroit styling by means of semantic and ikonographic arguments that could equally well have been used to demonstrate, say, how the London taxi, acclaimed by Charles Eames as the best industrial design in the world, reveals the communal death-wish of the English ruling classes.

1951-1961

an alphabetical chronicle of landmarks and influences

Alarmist Literature: In the 1950's the shortcomings of some aspects of product design became a subject for sensational journalism which—in some cases—contained an element of serious warning. The most prolific of these professional Jeremiahs was the American writer, Vance Packard, whose book *The Hidden Persuaders* drew attention to the social consequences of motivation research (q.v.). His subsequent works *The Status Seekers* and *The Waste Makers* continued variations of the same theme of social enquiry into design, but began to suggest that he had fallen victim to the very situation against which he was protesting: his elevation to the best-seller class involved him in the dynamics of the mass market and more or less committed him to bring out a 'new model' every other year. At a less sensational level, warnings to consumers were transmitted in Great Britain by way of the Editorials in *Which?* and *Shoppers' Guide.*

Appliance: The increasing mechanization of households in the Western world, and the beginning of mechanization of households in other continents, gave a special status to electrical and other power-operated tools in the eyes of manufacturers, designers and consumers. The rise of 'do-it-yourself' acquainted many householders with small power tools for the first time, but also introduced a degree of mechanization into the creative work of painters, sculptors and designers, thus giving them an increased first-hand knowledge and sympathy for the world of appliance design—the whole output of Charles Eames (q.v.) can be related in one way or another to the mechanization of the designers' workshop, but appliances also claimed a widely recognized function as indicators of the social status of their owners. The diversification of different types of refrigerators and washing-machines, not to mention the almost annual increase in the screen size of television sets, became a recognized method of indicating or claiming improved social and financial status, and was duly damned by puritanical critics and sociologists. At the same time, however, certain less grandiose appliances became the accepted symbols of intellectual status—the possession of an Olivetti typewriter (q.v.) or a Braun gramophone or radio became one of the standard ploys in the world of intellectual snobbery.


Braun radio

Eames must be saluted at this point as the last figure from the architectural side to make a significant contribution—with his Ahmedabad Report—to design thinking. Otherwise, architects have relinquished control of the mind of design to theorists and critics from practically any other field under the sun. The new men in the USA, for instance, are, typically, liberal sociologists like David Reisman or Eric Larrabee; in Germany, the new men at Ulm are mathematicians, like Horst Rittel, or experimental psychologists like Mervyn Perrine; in Britain they tend to come from an industrial background, like Peter Sharp, John Chris Jones or Bruce Archer, or from the pop-art polemics at the ICA like Richard Hamilton. In most Western Countries, the appearance of consumer-defence organizations has added yet another voice, another viewpoint, though no very positive philosophy.

In these circumstances, where no single viewpoint is sufficiently widely held to make effective communication possible, arguments tend to be conducted in an eclectic framework of postulates gathered from a variety of disciplines; the basis of selection may be unscrupulously slanted to justify some point of view to which the speaker is committed (this is true of most arguments on aesthetics or styling) or, more honestly, to give directions through a field that needs to be explored—hence the pre-occupation with information theory at Ulm, where it is felt that many pieces of equipment are insufficiently explicit about their functions and mode of use. Lash-up formulations of this sort are, of course, only *ad hoc* intellectual structures and should be neatly put away when they have done the job for which they were assembled. Thus, a narrowly Stalinist frame of reference, rigidly maintained beyond its last point of utility, has resulted in the sterility and subsequent disappearance of radical left-wing design criticism in Western democracies, and leaves intelligent socialists, like Richard Hoggart, apparently sharing the opinions of an 'Establishment' that they otherwise despise.

For those who are not too rigid, however, the situation is, as the saying goes, manipulative—it is possible to discuss anything, even the validity of the architectural claim. Not on the basis of right or wrong—Industrial Design can use a short rest from exclusive moralities—but on the basis of what contribution architects could reasonably be expected to make, and the needs they might reasonably hope to see satisfied.

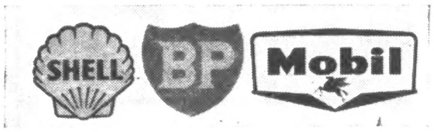
Looking back, one sees that in truth large parts of the architectural claim have never been seriously pressed—aircraft design, for instance, has cheerfully been left to aerodynamicists, architects retaining only the right to criticize the results. There are other areas where architects have persistently intervened—pleasure boats are an example—without contributing anything very interesting to their design; clearly, architects have extra-curricular activities where they put their professional skills on one side. But, where, then, is the architect's real area of painful or profitable involvement with industrial design? It is easiest to define convincingly by considering questions of scale and propinquity—how big things are, and how near to buildings. A survey of architectural communications such as conversations, letters to editors, and other daily small-talk will show that architects are hypersensitive to the design of objects roughly comparable in scale to building components. Some of this sensitivity is simply an atavistic relic from the days when the architectural claim was universal in its coverage, but if it is trimmed down to include only objects in or near buildings, then it makes operational sense. Architects are clearly right to be concerned over the design of things like automobiles, lamp-posts, refrigerators and crockery, since these are classes of objects that commonly inhabit the same view, occupy the same space, supplement the functions of their buildings and no one in his right mind will deny their right to be heard on such subjects.

To say this is not to revive inflationary or imperialistic claims that architects are 'total designers' or 'responsible for the whole human environment,' but simply to say that even if the practice of architecture is viewed in quite a narrow and conventional professional sense, there is a wide variety of equipment which is not structurally part of their buildings nor mentioned in the specification, but is, nevertheless, their concern and ought to be much more their concern than it is at present. Even if we no longer regard the architect as the universal analogy for the designer, a large area of the architectural claim is rightly his. But if this is an area where he has rights, then he also has responsibilities. If he is to be heard, then his utterance must carry weight—howls of 'I won't have that ugly trash in my building' will no longer serve, reasons must be given, improvements suggested.

But how? If architects have lost their original dominance over the field—a dominance

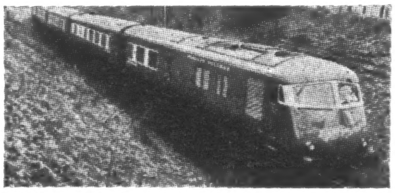
Aspen Congress: One of the major international centres of discussion of industrial design was established at the mountain resort of Aspen, Colorado, which had been built up by the late Walter Paepke, President of Container Corporation of America, as a species of secular retreat for meditation and discussion among business executives. The Annual Design Congress there, of which there have been now twelve, confronted the leading opinion-makers of the American business world with designers, manufacturers, critics and theorists from Europe, South America and Japan. While the findings of these congresses don't constitute a body of literature comparable with that of CIAM, the reports made annually by speakers returning to their native countries and customary business, have provided a running survey of the preoccupations and troubles of thinking designers all over the world. Aspen has, to some extent, replaced the Triennale (q.v.) as a world centre of opinion and debate.

Brand Image (or House Style): During the 1950's it became the practice in all large industrial concerns to inculcate into the minds of the public a recognizable style to identify their products or services. In many cases this was a process of necessary rationalization where a large firm found itself with a number of different styles and a number of different designers. Where unification of style was undertaken as a form of rationalization and in good taste, this process was known as 'creating a house style,' but where it was undertaken as part of an advertising campaign it was called 'fixing the brand image.' Examples of both processes can be seen in the stabilization of the design of filling-stations and filling-station equipment by such companies as Shell/BP or Esso, both of whom developed international styles in the period; in the restyling programmes undertaken by brewery companies like Courage in the earlier 1950's, and Watney towards the end of the decade; and in the restyling of chain stores.

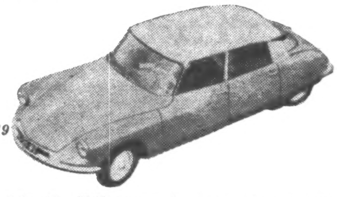


brand images

British Railways: Though it is the largest industrial concern in Britain, and probably in Europe, British Railways did not set the universally high standards of design that were hoped for at the time of nationalization. Nevertheless, valiant efforts were made, in spite of the progressive dismemberment of British Railways into independent regions, and as nationalized concerns go, it has probably done as much as any, except the Post Office, to promote a lively attitude to design. The change-over to diesel traction has had industrial designers built into the contract as consultants almost from the beginning, and although there have been technical difficulties, the influence of Design Research Unit and of Jack Howe has been noticeably beneficial. Other British Railways adventures in design include experimental carriage interiors designed by various architects; the setting up of a Design Advisory Panel in an attempt to improve the style of station equipment; and the activities of Eastern Region's development group in improved ticket-office design; and in commissioning waiting-room furniture by Robin Day which should become standard for all regions.



midland pullman



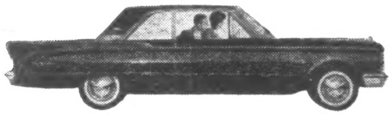
D.S.19

Citroen: Like the Volkswagen (q.v.) the Citroen was one of the two fixed points in a world of rapidly changing car design—until 1957 when the familiar *Traction-avant* of 1934 vintage was dramatically replaced by the DS 19. Although few found it possible to admire the DS's apparent mixture of different automotive styles, brand-loyalty coupled with something like awe at its technical specification served to establish the DS, almost at once, in the same position of esteem as was enjoyed by the preceding model, and by the end of the decade its radical appearance no longer excited the same alarm as before.

Consumer Research: The formal recognition of a specific consumer viewpoint in relation to industrial design is one of the more important new factors that has emerged in the 1950's. Viewed broadly, it covers market research into consumer preferences and human engineering or ergonomics (q.v.) as well as what is more specifically regarded as the defence of consumers' interests. Organizations for this latter purpose have emerged both at an official and unofficial level; thus most of the nationalized industries have some form of Consumers' Consultative Committee built into their administrative structure, and the British Standards Institute sponsors a Consumers' Advisory Council which publishes a periodical—*Shoppers' Guide*. However, there are also Consumer organizations whose attitude embodies an element of social protest, viz.: The Consumers' Councils in the USA and the Consumers' Association in England, which publishes a periodical called *Which*?, and whose leading figure, Michael Young, has even proposed the formation of a Consumers political party (see his pamphlet *The Chipped White Cups of Dover*).

Design Centre: The foundation of the Design Centre in the Haymarket, London, gave the Council of Industrial Design an opportunity to give tangible form to its views on design by placing on show a constantly changing selection of products, chosen by Committees appointed by the Council. Although the selections have constantly been a subject of dispute throughout the subsequent five years of the Centre's existence, they have undoubtedly performed an important function, if only in putting before the public alternatives to the normal commercial selections undertaken by buyers for even the most progressive shops. It was only towards the end of this five-year period that doubts began to be expressed that the Centre might be driving the Council of Industrial Design into something like a commercial position itself, when it was observed that the rents recovered from exhibitors at the Centre amounted to a sizeable proportion of the Council's income.

Detroit: If the most suspect aspects of commercial design were symbolized by any one object or class of objects in the 1950's it was by the American automobile and by Detroit, the centre of the United States automobile industry—the phrase 'Detroit-Macchiavellismus' was coined in Germany to describe everything that was felt to be hateful about US design. At the same time, there was a visible tendency to admire Detroit products for their unconventionality and boldness, and even in some circles serious attempts to discuss objectively their social and moral implications. In many ways Detroit was a symbol also for the War of the Generations, and the language of American automobile advertising became the language of revolt among the young. The hard core of any admiration for Detroit, however, was the belief that here was a language of visual design, no longer based on subjective standards like 'good taste,' but on objective research into consumers' preference and motivations. The phrase 'an objective aesthetic' could be taken to refer either to the absolute logic of pure form or to absolute subjection to market research statistics.



Ford Comet

Eames, Charles: Although a number of substantial figures in the world of design emerged in or around the decade following the Festival of Britain, none has made so great an impact on the world, both by his products and his personality, as Charles Eames. By 1951 his first chairs in moulded plywood on steel frames, were becoming known outside the United States of America, and were the inspiration of innumerable copies all over Europe, and in most other continents. It was generally recognized that the Eames Chair constituted the first major development in chair design since the Breuer chairs of 1928. After this there followed, in a bewildering succession, toys, films, scientific researches, lecture tours, special exhibits, three further generations of chairs, the celebrated Ahmedabad report on design in development countries, and a great number of awards and citations, culminating in the Kaufmann award to himself and his wife Ray in recognition of their work together for the progress of industrial design.

always more *de jure* than *de facto*—what is their standing now? It is precisely at the level of objects comparable in scale to building components that the average architect's capacity as a designer begins to taper off, and this diminished capacity is due far less to technical ignorance of, say, electronics or gas technology, than to the training, experience and habits of mind that fit a man to be an architect. This combination of intellectual factors tends to make an architect not only unfit to design free-standing appliances, but even the interiors of his own buildings—as the ARCHITECTURAL REVIEW pointed out in justification of its *Interior Design* features in April 1958.

As was also pointed out then, the fundamental difficulty is incompatible rates of obsolescence; architects, for entirely valid reasons, are habituated to think in terms of a time scale whose basic unit is about half a century. Industrial design works on a variety of time-scales, roughly proportional to the bulk of the objects being designed, and none of them phased in units one fifth the size of the architect's. This situation is not the product of an evil economic situation, as professional alarmists like Vance Packard maintain (though there is a constant pressure towards hastened obsolescence in capitalist countries) but exists because industrial designers are creating objects in which the opposing forces of stabilized investment and technical improvement are in a different equilibrium to that governing the design of a building. A building-structure will not be disastrously out of date for some centuries in many cases, and there are lifts at work in London that saw the century in, but are still mechanically sound and have not been rendered noticeably obsolete by sixty years of technical improvement.

But a sixty year old car, even if in perfect mechanical condition, would nowadays cause traffic jams and invite accidents if it were let loose among the nimbler products of more recent decades—as witness the elaborate policing and marshalling required to isolate the carefully maintained veterans on the Brighton Run from real traffic. This is an extreme case of rapid mechanical obsolescence, no doubt (only by an architect's standards, by those of aeronautics or electronics, automotive technology has been sluggish) but it can easily be paralleled inside buildings—consider the history of electric lighting from carbon filament to colour corrected cathode, from the concentrated light source of a bare bulb in an exposed socket, that even Brutalists tolerate only as a gesture, to the even glow from a lumenated ceiling that psychologists and physiologists are already beginning to question for going too far the other way.

The design of light fittings is very much a case in point. On the basis of scale and propinquity, they lie firmly within the architectural area of concern. Over the years, a number of leading modern architects, from Rietveld to Utzon, have made forays into the field of lighting design, and—the product being mechanically simple—they have been able to produce equipment that was workable as well as handsome. But, reviewing the period covered by this development, one cannot help feeling that an excess of aesthetic and emotional capital has been squandered on ephemera. There is hardly any important modern-movement interior that is still lit as the architect originally designed it—not only the equipment but the whole installation has been rendered obsolete by later events.

In other fields, where their technical inadequacies are more obtrusive, architects can only do what they affect to despise in other designers—style up the outside of machinery that has been designed by somebody else. The polite name for this, of course, is 'built-in equipment' in which everything the architect is incapable of designing is bundled into cupboards that he *can* design. But this solution, too, is subject to the effects of technical obsolescence, as cookers, radios, and so forth, change their bulk, performance, power needs and relationship to the surrounding space, and entirely new equipment such as TV enters the domestic scene. Built-in equipment is little more than an attempt to impose a veneer of totalitarian order in a situation where something like democratic give and take may have been more to the point.

This, again, is not to ask the architect to abandon responsibility for the equipment in the buildings he is called upon to design, for it is possible to abandon the position of autocratic dominance implicit in Bauhaus theory without losing control of the over-all design. Very small powers of accommodation enable an architect to do what Le Corbusier anticipated as long ago as 1925, that is, to exercise creative choice. His *Pavillon de l'Esprit Nouveau* was entirely furnished and equipped from manufacturers' catalogues, without the architect himself having to design a thing.* Although the convincing unity

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*** There was one exception only to this programme, the free-standing cupboard unit, which Le Corbusier had, in fact, designed as a prototype for manufacture by Thonet.**

of the total effect was doubtless helped by the fact that the rooms themselves had been designed in what he conceived to be the style of the objects that were to furnish them (and in this there is a lesson to be pondered), the whole operation was a triumph of disciplined and adventurous selection from what was at hand.

This, in practice, is how most architects and interior designers work anyhow. In the 1960's an architect knows he will be able to equip his interiors with Eames chairs, Noguchi lamps, Braun radios, Saarinen tables and so forth from stock, and the knowledge of their availability probably colours his designing, unconsciously, from the very beginning. Coloured, but not inhibited—the catalogues also offer him Bertoia chairs, Jacobsen chairs, Robin Day chairs; Utzon lamps, Rotaflex lamps, Atlas lamps. . . . The range of choice is so broad that the equipment of the building by objects that were not designed by the architect may not diminish the value of the finished work by one material or aesthetic particular. Indeed, the prestige inherent in knowing that the chairs are by one of the world's greatest industrial designers and the radios by another adds a peculiar lustre to the whole operation.

However, the very breadth of choice increases the architect's responsibility—he must resist the temptation to hand over the interior to Jacobsen, Noguchi, Bertoia and Co. His choice must be disciplined by a clear idea of what the building has to do, and if there is nothing just right in the catalogues at hand, then he must go to other catalogues, his choice must be adventurous—*none* of the furniture in the Pavillon de l'Esprit Nouveau came from the catalogues of 'domestic' furniture manufacturers, it was all office and factory equipment.

Here, indeed, is one of the points where the architectural profession has a job to do in industrial design. By way of contract furnishing, architects are among the most articulate and most powerful sections of consumers, in some fields the most powerful absolutely. They have power economically in the market, they also have experience that far outstrips that of any domestic consumer who perhaps buys a dozen chairs in a lifetime, they are trained to study functional problems and human requirements. Simply by the exercise of their market influence, architects may find that they are in a position to kill a poor design, encourage a good one, and embolden a manufacturer to tool up for a new product. Further, by their experience and training they should be in a position to advise and assist manufacturers and designers to produce better goods, even where mechanical complexity puts them (as in the case of communications, ventilating systems, etc.) right outside their technical competence as architects.

This proposition may not be news, but it is worth saying again because it still needs to be acted upon; it is a field where positive action can be taken. However, there will be large fields of activity where the architect's careful design will be filled with equipment not chosen by an architect or a sympathetic interior designer, but by an ordinary domestic occupier. Here is a classic instance of a conflict between mass taste and the preferences of an elite—or, in the form of words used to describe the situation when the *Unité* at Marseilles was ready for occupation, 'What will happen when the bourgeoisie move in with their inherited prejudices and imitation Louis Quinze wardrobes?' Le Corbusier's solution, to build in so much built-in furniture that there was no room for wardrobes and barely room to voice a prejudice, was, in fact, the result of unforeseeable circumstances,* and not even he would normally advocate so undemocratic a procedure.

For the architect simply to 'retire hurt' when faced with this situation, is no solution, and the idea of designing 'background architecture' of studied neutrality is an unconvincing attempt to make a thin virtue from a pressing necessity—there is no way of disposing a door and a window in a rectangular space without setting up a relationship that can be wrecked by an ill-placed TV set. The need is some sort of reasonably permissive architecture with built-in directions about where to put things. The so-called Appliance-House solution to this problem has tended, so far, either to take too much for granted, or to make heavy weather of the directions. Either it assumes too readily a community of taste between architect and occupier (Kikutake's 'Sky House' is occupied by Kikutake himself, so the problem disappears, but what happens when someone else moves in) or else—as in most of the Smithson projects in this genre—the whole house tends to degenerate into a series of display niches for ever-changing relays of hire-purchased status-symbols.

But there is no need for such elaborate controls, nor for hidden persuaders hopefully

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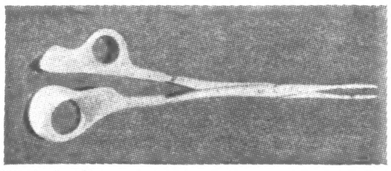
* The *Unité* was originally designed to house the unfurnished proletariat.

Ergonomics: The most important branch of design science by the end of the 1950's was undoubtedly Ergonomics, which seemed likely to push matters of taste and aesthetics well into the background. As the derivation of the word suggests, the earliest studies to receive the name were concerned with economy of human effort in the operation of mechanical equipment, notably complicated electronic and aeronautical equipment developed towards the end of the War, some of which taxed the mental and physical capacity of its operators beyond the limits of efficiency. By the end of the decade, however, the term had been expanded by thinkers and readers in many parts of the world to cover all forms of relationships between man and equipment, including purely physical studies of human engineering and the communicative studies of control systems and others, in which matters of mental capacity and perception of vision were involved. Unlike most words or phrases, which are promoted to the level of slogans or catchwords, Ergonomics has generated little facile optimism, except for a faith that by patient and painstaking research the relationship between men and their tools can be improved. At one level this has meant quite simply the reshaping of the handles of traditional tools, but at other levels it has meant exercises as abstract as the devising of new sets of symbols for the keys on the control panels of computers.



Hlavka handles

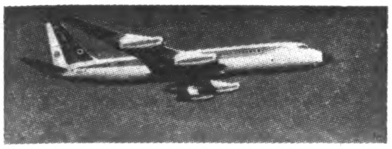
Festival of Britain: Great hopes were entertained for the influence that the Festival of Britain would have on the arts of design, and the level of public taste. At first sight, the whole exercise was a failure in these terms: its influence, as Sir Gerald Barry (its Director) more or less admitted in a 10th Anniversary lecture, has been practically negligible in the field of design—the 'Festival Style' has practically disappeared from the face of the land and left only a few travesties behind. But it is clear that for reasons that are not altogether coincidental, the Festival marks a turning point in the history of public taste in Britain. Public taste may not have improved, but it has become infinitely more sophisticated in the ten years since the Festival. This development must be attributed to the influence of the mass media such as television and illustrated magazines, but the Festival played a vital part in setting before the public an image of a brighter, smarter and more colourful world of design. This may not have been what the originators of the Festival set out to do, but in this they undoubtedly secured a lasting success.

Italian Craze: One of the most remarkable developments of the 1950's was the craze for Italian design which galvanized the smarter elements of all classes of British Society. The Scooter, the Olivetti typewriter, furniture by Gio Ponti, hairstyling by Richard Henry, Espresso coffee and its attendant machinery, certain tricks of shape, design and display, and even certain type faces from the Nebiolo foundry, helped to stamp the image of Italy as the home of good design at all levels of consumption. The reasons for this development have baffled critics and sociologists from the time of its first appearance in 1953 to its waning around 1960. The Triennale (q.v.) was a major contributing influence at the level of conscious design. The cinema and motor-racing also played their part, but explanations based simply on good taste and engineering cannot explain the whole Italian mania. Espresso machines, as several critics pointed out, usually had a strong flavour of Detroit or 'Paris 1925.' There is little doubt that the rise of teenage affluence and the improved quality of inexpensive, fashionable clothes, had also a large part in the phenomenon.

Japan: In 1960 it was discovered that Italian manufacturers were plagiarizing Japanese designs for transistor radios—a situation that symbolized, as well as anything could, the change of exotic influences on Western design. Everything in the way of studied elegance and rare qualities in the handling of materials that had been true of Italian design, was found to be yet more true of Japanese, with the added incentives of the abstract power of Japanese calligraphy, the philosophical prestige of Zen Buddhism, and the technical aptitude of the Japanese for Miniaturization (q.v.). At the architectural level these developments were supported by the growing reputation of men like Kenzo Tange and Maekawa, and the final seal of Western acceptance of Japanese dominance was set by the enthusiasm with which Western designers, critics and theorists participated in the World Design Congress in Tokyo in 1960.

Sony transistor TV

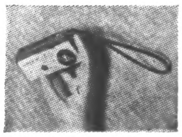
Convair 880



Jet Liners: The successful establishment of the Jet Passenger Liner in air transportation marked the first major break-through in air-line operation since the introduction of the first Boeings and Douglases early in the 1930's. They also marked a phase of increasing sophistication in air travel, and nearly all had their interiors designed by well-known industrial design offices, rather than by the aircraft designers. Whether French, American or British, all tended towards a grey and tan international style with aluminium trim, except for the Russians who resolutely maintained their traditional Victorian Rococo with cut-glass and flowers even on the TU104.

Magazines: Late in the 1950's one of the pioneer industrial design magazines passed away in one of those fits of financial cannibalism which currently overtake the British Press. However, *Art and Industry* had been displaced long before its death by the CoID magazine *Design* which—though born before the beginning of the decade under review—had gone from strength to strength in circulation, in breadth of vision (under the editorship of Michael Farr) and in international prestige. It was in particular one of the organs that made known the science of ergonomics (q.v.) to working designers all over the world. Its most distinguished foreign contemporaries by the end of the decade, though of varying influence in Britain, were *Industrial Design* (New York), the most professional of design magazines under the editorship of Jane Fiske McCullough who finally retired from the paper in 1960, and the other was *Stile Industria*, an offshoot of the Domus publishing house, under the editorship of Alberto Rosselli, which consistently maintained the Italian viewpoint, both on matters of practice and theoretical approach.

Medals and Awards: It was justifiably observed by an Italian critic that the ever-increasing supply of medals, certificates, prizes and other awards for designers, were signs of an inflationary epoch in design. As far as Britain is concerned the most important awards were those given by the CoID under a variety of names, finally stabilized as the 'Design Centre Awards.' These were supplemented in 1959 by the 'Duke of Edinburgh's Award for Elegant Design,' a clear indication of the vastly increased prestige of industrial design in the eyes of British governing classes. Perhaps the most hotly discussed of all awards in the 1950's was the 'Compasso d'Oro,' sponsored by the Rinascente store in Milan as a kind of annual supplement to the Triennale. Awarded on an international basis by an international jury, the Compasso d'Oro reflected a growing crisis on design criticism by being awarded in 1960 and 1961 to the CoID, and to MIT, thus showing a clear lack of any confidence in the jury's ability to select an individual design or individual designer for a premiation; in contrast, the jury of the Kaufmann award (founded in 1960) clearly had no difficulty in awarding their substantial money prize to Charles and Ray Eames.



Yashika camera

Miniaturization: The transistor radio has become the most obvious symbol of miniaturization in practice, and is the culminating development of a train of thinking in electronics which has been proceeding since the first airborne radar during the second World War. However, it is not the only trend in electronics, as witness the growing size of television screens, and it is not restricted to the electronic field. There has been a conspicuous and growing development of miniaturization in the world of personal transport, made possible by accumulated mechanical improvements over the previous 20 years. Italian motor-scooters at the beginning of the 1950's were succeeded by German bubble-cars in the middle of the decade, and by the BMC Ado 150 (Mini-Minor or Austin 7) at the end of the decade. At the same time, Detroit reversed its own committed policy and introduced a flock of compact cars which, like the European miniatures, were distinguished by radical technical improvements as well as their diminished size.

contrived out of plays of colour and lighting—though these have never yet proven sufficiently reliable to direct a Louis Quinze Wardrobe or seven cubic foot refrigerator to the point where the architect hopes to find it. On the contrary, the traditional location of a fifteen-amp plug next to the traditional British fireplace has done much to keep the TV set within the traditional area of focused attention in the traditional British sitting room. With this approach, the architect no longer attempts to impersonate all the characters in the drama of design, as in the days of the universal analogy, but becomes the producer of the play, handling a mixed cast of metropolitan professionals and local talent.

This is a workable situation, provided the producer knows his players well enough to gauge the effect of ad-libbing and playing off the cuff—what happens in the architectural dialogue between dressing-table and light source, how far the eternal triangle of the three-piece suite can be expected to share the stage with a picture window opposite the fireplace. To handle these problems effectively—so effectively that he need not regret that the objects involved are not designed as he would have designed them—an architect needs to know just how, and how strongly, some desirable and visually fascinating piece of equipment like a tape recorder or a coffee-percolator focuses attention and thence organizes the visual and functional space around it. This must be known and thoroughly understood, if only at the intuitive level of knowing instinctively that a poster will always have a more galvanic effect than an abstract painting, that the real landmark in the length of the Grande Galérie of the Louvre is not the Mona Lisa but the view out of the window into the traffic of the Place du Carrousel.

It might appear, on the strength of a broad survey of present purely technical trends in design, that this problem is about to disappear. A really desirable and sophisticated (in the engineer's sense of the term) central heating system deals with the problem of the well-designed radiator by abolishing radiators and disappearing into the floor-slab or under the carpet. A man who looked at a TV set of *Britain Can Make It* vintage saw a lot of cabinet work as well as a small screen, but a head-on view of a modern twenty-one-incher is apt to consist simply of the screen itself. Nothing has shrunk faster than stereophonic gramophones, except sound radio, where transistors have produced such rapid miniaturization that there is a sort of regretful vacuum round the source of sound. And just when architects were despairing of ever making much visual and spatial sense of domestic exteriors lumbered with *two* status-boasting, jet-styled Detroitniks, suddenly there were compacts and Mini-minors.

Miniaturization appears to be a consistent tendency at present, that must be agreed, but the chances are that the objects concerned will become more concentratedly desirable as they become smaller, or more functionally important as the systems they control vanish from sight. When the heat-source is invisible, its controls must be more visible than in the days when the tap accompanied a large, conspicuous radiator; when the radio becomes no bigger than an ashtray, then there is clearly a chance that it will become the equivalent of art-pottery—on a table in the office of the US Ambassador to London there was recently a transistor radio in an elaborately hand-chased brass box, like an eighteenth-century clock mechanism.

The chances are, then, that the miniaturized product is going to demand attention with a hard, gem-like insistence, and focus attention as surely as the red button on which our atomic fate depends. And if it works by batteries, it may not be possible to fix its place on the domestic scene by a crafty location of power outlets. But the world of the miniaturized product is also the world of the visually sophisticated consumer, who may be susceptible to other forms of persuasion, may even, before long, be in a mental condition to seek architectural advice.

To sum up, the passing of the architect's claim to be the absolute master of the visual environment has not greatly reduced the area of his real responsibility at both the visual and functional levels. In fact, his responsibilities have increased—the stakes mark out a smaller claim, but he now has to dig all of it. The manner of implementing these responsibilities is not simply to assume control of the schools and expect everyone to accept architectural standards as the norm of judgment, as the theorists of the Thirties supposed, but to exercise choice and background control over the choice of others, to advise, suggest and demand on the basis of knowledge and understanding. Conceivably there may be less glory involved than in being able to sign one's name to everything as 'designer' but there may be more useful work done and better service rendered to the public. If that is so, then ten years of uncertainty and dispute will not have been in vain.

1951-1961

Motivation Research: The branch of advertising regarded with the gravest suspicion in alarmist literature (q.v.) was Motivation Research, which formed the theme of Packard's first book *The Hidden Persuaders*. The object of this rather dubious science was to establish the 'real' or subconscious reasons for buying one product or another. It is thus, in a sense, a sub-branch of ergonomics since it deals with a particular, though short-lived, relationship between man and equipment, and was cautiously welcomed by broad-minded ergonomists as an extension of our precise knowledge of man. Conversely, the manipulative intentions of its practitioners were clearly liable to anti-social perversion, but any mass take-over of consumers' minds seems to have been prevented by the imprecision of MR techniques of investigation. From the designer's point of view, MR was most suspect as yet another restriction on his freedom to design and his freedom to serve the public as he felt best. Yet it should be noted that one of the major triumphs of MR's High-Priest, Dr. Ernest Dichter, was to make a suggestion that any competent designer should have been able to make before he appeared on the scene, that is, the fitting of rear-view mirrors to farm tractors so that those who set their hands to the plough need not look back.

Olivetti diaspron

Olivetti: The place of the Olivetti typewriter, both in the Italian craze and in the wider design sense, was best illustrated by the violent reaction to its threatened demise in 1960. The original design for the small portable (which has always been the hinge of the argument) was the work of Marcello Nizzoli, who is, of course, still the designer responsible for all Olivetti products. The neat, squarish case he devised was constantly being held up as an example of pure straightforward design in contrast to American 'styling,' but was in fact itself a styling job, since Nizzoli was in no way responsible for the machinery inside. This point was avoided in discussion until Diaspron, a larger typewriter, appeared in late 1959. This had faceted side and front panels, no doubt for quite sound constructional reasons, but immediately brought down the wrath of the critics on Nizzoli's head, because it was (apparently) 'irresponsible styling.' The reasons for the change of style, apart from any technical considerations, were clearly commercial, but Olivetti, probably because of his enlightened social policy, has always been treated as if he were nothing to do with commerce. What will happen under the new style and the new management, which has succeeded since Adriano Olivetti's early death, remains to be seen.

Organizations: The profession of designer became more heavily organized as well as more heavily bemedalled as the idea of design as an independent profession took hold and established itself. No longer content to proceed under the aegis of other professional bodies, such as those devoted to architecture, designers established or took control of new organizations in order to speak with their own voice. In Britain a major attempt was made to give the SIA (Society of Industrial Artists) a status and function equivalent almost to that of the RIBA, and, at a wider level, ICSID (International Council of Societies for Industrial Design) founded in 1957, began to assume functions broadly analagous to those of the IUA, though it has, so far, met more frequently. One of the major professional problems of both bodies has been the stabilization or establishment of effective copyright in design—a matter in which they are professionally ahead of architects.

Packaging: New ways of selling, summed up in the ambiguous phrase 'merchandising' centred attention on the way in which goods were presented at the point of sale, but they also brought new classes of goods within the field covered by the package-designer's art. If frozen foods were the classic example of the new merchandising and the new packaging techniques, it should also be observed that long-playing gramophone records in their smartly designed sleeves, and reprints of best-sellers in exclamatory paper-back bindings, brought music and literature into the realm of general merchandising, both being sold through general stores, tobacconists and other non-specialist outlets. The actual design of such packages became one of the most flourishing departments of the graphic arts during this decade and like TV (q.v.) brought the latest and most sophisticated types of design into domestic environments which had hitherto been immune to them.

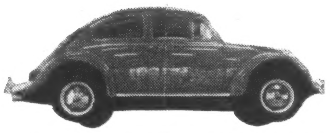
THE GREATEST PACKAGE
OF JAZZ
EVER ASSEMBLED!

'Pop' Art: Alongside ergonomics (q.v.) one of the emergent concepts, though a bitterly disputed one, of the 1950's, was that of 'pop' art. This was distinguished from earlier vernacular arts by the professionalism and expertise of its practitioners (i.e. Rock 'n' Roll singers, TV stars, etc.). The concept was widely discussed in Europe and the United States, and impinges on industrial design at two points—two points which are not altogether independent of one another. Firstly, its visual manifestations, as in advertising or Detroit car-styling, were often endowed with a vitality (not always bogus) that seemed absent from the fine arts and from 'good' design. Secondly, the protagonists of 'pop' art at an intellectual level, i.e. those who insisted that it should be taken seriously and discussed rationally, maintained that there was no such thing as good and bad taste, but that each identifiable group or stratum of Society had it own characteristic taste and style of design—a proposition which clearly undermines the argument on which nearly all previous writing about taste in design had been based. This position was not adopted by any established authority in design, but was given serious discussion at some schools and was certainly accepted by a large part of the student body in *most* schools.

Television: The great increase in popular sophistication about all visual matters, including design, in the 1950's must be largely attributed to Television, even more than to magazines or educational bodies. For the first time, almost, in the history of man, a great part of the population was introduced to a constant stream of smart visual images, was shown new products and Old Masters, either in their own right or as the backgrounds to drama and discussion. In so far as well-designed products are smart in appearance, they have undoubtedly benefited from this trend whose influence had hardly been anticipated at the beginning of the 1950's. Television companies themselves seemed only half aware of the genie they had conjured out of the electronic lamp, but programmes dealing specifically with design and visual arts, became a little more common as the 1960's began, on both the BBC and commercial networks.

Triennale: Four *Triennali di Milano* fall within the scope of this survey and of these, only the 11th in 1957 can be dismissed as trivial, partly because of the poor quality of the exhibits, and partly because of its failure to pull in an influential audience—neither the trend-setters, nor their followers took much notice of it. The 9th and 10th (1951 and 1954), however, probably did more to establish the image of Italian design in the public mind than any other equivalent manifestation, and the 10th was followed by a Congress on industrial design that marks the beginning of a new self-consciousness among Italian designers, and sense of international solidarity amongst designers at large. The disappointing results of the 11th were to some extent a consequence of Italian self-satisfaction with the preceding two, and a degree of international boredom with Italian design that was already becoming apparent among the leaders of taste, if not among the mass followers. The 12th in 1960 was at cross-purposes with its audience. Intended as a serious revival of the best standards of the Triennale, it was unfortunately attended largely by those who had only now caught up with Italian design at a purely fashionable level, and its exhibits did not really receive the discussion that was their due. Among those exhibits was, of course, the complete Nottingham school which marks probably Britain's greatest impact on the international world of design.

Ulm: The Hochschule für Gestaltung at Ulm was certainly among the most important design organizations to emerge in the last ten years. Originally founded in memorial piety as a successor to the Bauhaus at the time that most of the American descendants of the Bauhaus were going into decline, it had a functional plan in its buildings (designed by Max Bill) and a teaching programme (also directed by Max Bill) that both strongly recalled the original Bauhaus. In 1956 and 1957, however, there was something of a 'Palace Revolution' and a new order effectively headed by Tomas Maldonado took over the running of the school. An innovation of considerable importance made on this point was the disappearance of the Fine Art or Graphics department such as one normally finds in a school of this sort and their replacement by a division of verbal and visual communication. Ulm was thus the first school to withdraw completely and programmatically from the earlier dispensation dominated by architecture (here replaced by industrialized building) and by the Fine Arts. Although small, the school proved extremely influential in the world of design, at least at the level of ideas. Its manner of designing is best known through the cabinet work of Braun electrical appliances, but it has so far produced no characteristic style of design. Rather it has become a cool training ground for a technocratic élite.


V.W.

Volkswagen: Since the end of the second World War, the design of motor-cars has been in constant revolution, but the standard against which most cars have been judged and found wanting (not always justifiably) has been the Volkswagen. Clearly it is a car that has meant different things to different men, but the points on which its reputation is based, are primarily these: That it had, until recently and with very few exceptions, a more advanced technical specification than any other vehicle produced in quantity, and that spares and after-sales service set a standard of practical involvement with users, and their problems, that few other manufacturers could equal. But the overwhelming virtue in the eyes of men of liberal conscience was that in a world of automotive flux its appearance remained constant and that in a period when cars grew larger year by year, it remained the same size. In other words, it was a symbol of protest against standards of Detroit, the mass media and the 'pop' arts.

GROPIUS AT TWENTY-SIX

The memorandum which follows was written by Walter Gropius when he was but twenty-six years old. It has never been printed before. It was first mentioned in a footnote to Professor Pevsner's Pioneers of the Modern Movement *(*1936, *p.* 215*) and then in about fifteen lines in Professor Giedion's* Walter Gropius, Work and Teamwork *(*1954, *p.* 74*). It is memorable not only as by far the earliest of Gropius's writings, but also as a remarkably early plea for prefabrication of parts and assembly on the site. It was presented in March,* 1910, *to the AEG, the electricity company for which Gropius's master Peter Behrens was just then designing factories as well as products, and shops as well as stationery. Gropius left Behrens in* 1910, *and so this memorandum must be one of his first attempts at creating work for himself. The second was the offer of* 1911 *to design the Fagus factory which was accepted and started Gropius in independent practice. He had, however, when still a student, designed some farm labourers' cottages in Pomerania (see page* 50*). The memorandum is youthful and repetitive. It never reaches a convincing decision between suggesting a new organization of building and the much simpler but vaguer job of putting to the test the principles of the* Werkbund *(founded in* 1907*) and pleading for factory-made furniture, china, cutlery, etc. It even falters between presenting itself as a proposal for a company and a prospectus of a company. But it contains many interesting points, such as the references to England and the two brief hints at the provision of centralized services. And it is proof of how clearly Gropius, already in* 1910 *and* 1911, *saw what was going to be his endeavour from the Bauhaus years to the present day.*

Programme for the Establishment of a Company for the Provision of Housing on Aesthetically Consistent Principles

Underlying idea

The company which is to be established regards the industrialization of housing as its aim, in order to provide for the building of houses the incontestable advantages of industrial production, i.e. best materials and workmanship and a cheap price.

It is the fault of speculative builders and entrepreneurs that housing has deteriorated so much in the last decade both as regards taste and durability. The public consciously or unconsciously is affected by this state of affairs. Everybody with an inborn or acquired sense of quality must find the bragging, purely superficial, sham comfort unbearable which entrepreneurs, in the houses they build, try to produce for the sake of advertising, but at the expense of good material, solid workmanship, distinction and simplicity. It can be said that pomposity and a false romanticism instead of good proportions and serviceable simplicity have become the trend of our time.

The reason for this malaise is the fact that the public is always at a disadvantage, whether it builds with an entrepreneur or with an architect. The entrepreneur is justly avoided by many, because he unscrupulously hurries projects through in order to save costs, and because he does damage to his client by saving materials and wages in order to increase his own profit. The architect on the other hand who provides designs only is interested in raising the cost of a job, since final cost determines his fee. In both cases the client is the sufferer. His ideal is the artist architect who sacrifices all to aesthetic aims and thereby does economic damage to himself.

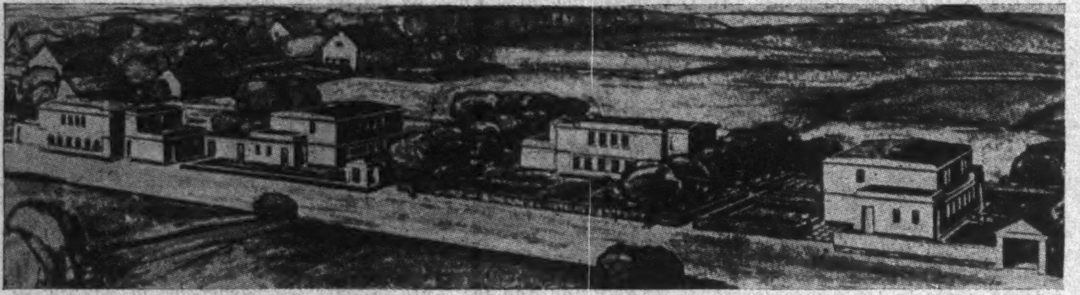
These points demonstrate patently the unhealthy situation in to-day's building trades. Enterprises based on craftsmanship still exist in the building trade, but can no longer resist the competition of industry. For in the case of quantity production overheads spent on creation and design while developing a type which could in the end be established as an ideal, are negligible in proportion to turnover, whereas they cannot be afforded in production by ones.

The fundamental principle of industry is subdivision of labour. The creator concentrates all his energies on making his idea, his creation come to life, the manufacturer concentrates his on durable and cheap production, the merchant on well organized distribution of the product. This use of specialists is the only way by which essential, i.e. spiritual, creation can be made to work economically and the public can be supplied with products of

1, *Walter Gropius photographed when he was still at the Bauhaus.*

aesthetically and technically good quality.

It is true also of the building of houses. To a certain extent industrial production has already entered this field, but the types introduced by entrepreneurs for the sake of making profits are immature and technically as well as aesthetically bad and therefore inferior in quality to houses whose parts are still produced by hand. However, the craftsman's work is probably too costly, and entrepreneurs have for the sake of cheapness tried from the start to eliminate it as far as possible.



2, *farm labourers' cottages in Pomerania, designed by Walter Gropius in 1906.*

The new Company is to draw the consequences from this situation and combine by means of industrialization the aesthetic activity of the architect and the economic activity of the entrepreneur. This would result in healthier conditions and patent aesthetic advantages. For whereas up to now the busy architect had to rely more or less on trained assistants and was unable to attend personally to all the details of his designs, money can be spent profitably by the Company on the slow and most careful working through of all details by the architect himself, before they go into production. Thus a happy union would be established between art and technics and a large public enabled to possess mature works of architecture and reliable and durable products.

The reason why careful detailing in all respects can, even where a simple house is concerned, be of such high cultural significance lies much deeper. It lies in the concept of a *Zeitstil.*

The way private houses are built to-day, the tendency deliberately to stress uniqueness, i.e. the opposite of the principles of modern industry, cannot possibly create a type of housing characteristic of our age. Methods based on craftsmanship are antiquated and must be replaced by the acceptance of a modern concept of industry. The search for the odd, the wish to be different from one's neighbour makes unity of style impossible. It is a search for what is novel, not for the perfect type. The example of all styles of the past shows that they all worked to established formal principles with variations only to fit special cases.

Conventions in the good sense of the word cannot be hoped for by emphasizing individuality. They depend on the contrary on unification, the rhythm of repetition, i.e. the consistency of forms, recurrent because recognized as good. Our age, after a sad *interregnum*, is approaching a *Zeitstil* which will honour traditions but fight false romanticism. Objectivity and reliability are once more gaining ground.

The necessity of conventions can also be demonstrated from their practical advantages. The more an individual groundplan differs from what is based on the needs of an age and has been worked out by generations, the more will its own qualities suffer. What is true of the plan, is true of the whole house. Past periods respected traditions. The Dutch brick house, the French block of flats of the eighteenth century, the *Biedermeier* house of about 1800 were all repeated in series. In England this desire for conventional identity, based on a firm power to organize, led to terrace housing of exact identity continued without any break through whole districts. The result was great economies and at the same time, and admittedly unintentional, aesthetic consistency. However, because the English builders did not intend to produce works of art, their single-minded pursuit of economic advantages produced in the elevations a drab uniformity.

The new Company intends to offer its clients not only inexpensive, well-built and practical houses and in addition a guarantee of good taste, but also take into consideration individual wishes without sacrificing to them the principle of industrial consistency.

The realization of the idea

I. Use of the same parts and materials for all houses

The idea of industrialization in housing can be translated into reality by repeating individual parts in all the designs promoted by the Company. This makes mass production possible and promotes low costs and high rentability. Only by mass-producing can really good products be provided. With the present methods of building houses it is a matter of luck whether one finds efficient and reliable craftsmen. Mass-production in a factory guarantees identity of products.

Nearly all parts of a house can be produced in factories, such as

Building
Staircases
Railings
Windows
Doors
Cornices
Doorways
Balconies
Bay windows
Verandas
Dormer windows
Grilles*

Decorating and furnishing
Furniture
Panelling
Ceiling panels
Floors
Wallpapers
Door furniture, handles, key-holes, etc.
Linoleum
Lincrusta
Light fittings
Textiles
Ceramics
Cutlery

Given the trend of our age to eliminate the craftsman more and more, yet greater savings by means of industrialization can be foretold, though in our country they may for the time being still appear utopian. In America, Edison pours in variable iron forms whole houses with walls, ceilings, staircases, plumbing, etc., and can thereby dispense even with the bricklayer and joiner.†

For all essential parts the best dimensions have to be decided first of all. These standard dimensions form the basis for the designs and are to be kept in future designs. Only by this means can mass sales be guaranteed and special making in the case of replacements and repairs be avoided.

Of each item there are available a number of designs of different execution and price, but the same size.

All questions of form, colour, material and internal equipment are put down and catalogued as variants. All parts fit exactly, as they are made by machine to the same standard dimensions. For the same reasons they are all interchangeable.

Internal features such as ceiling panels, stone floors or wooden floors, panelling, wall coverings in pressed materials are designed for all parts of the home so that they can be supplied at once.

Furnishings promise to be an important field. Experience shows that turnover is quick and sales easy. Furniture, light fittings, rugs, textiles of all kinds, linen, ceramics, cutlery, etc., are to be made to a variety of tested designs and can be supplied quickly and inexpensively.

In the same way all technical and sanitary installation, i.e. hot and cold water, bathroom equipment, electrically operated ventilation, electric lighting and cooking apparatus will be ready-made and offered according to what arrangement and price are suitable.

Colours and combinations of materials are set down in tables.

The client can compose his house from all these materials and forms according to his personal taste. He first chooses from among available types of house. However, even the type is variable as will be demonstrated later. The same plan can be had with a proper upper storey or an attic storey, with larger or smaller kitchen, and with a wide variety of details. The choice of materials also is the client's. He can specify rendering, brick, or stone, a slate or a tile roof.

It is by the provision of interchangeable parts that the Company can meet the public's desire for individuality and offer the client the pleasure of personal choice and initiative without jettisoning aesthetic unity. Each house is in the end its own self by means of form, material and colour.

Contracts with suitable specialist manufacturers secure that all objects and parts satisfy the standards laid down by the Company and are, if possible, permanently in stock. As soon as an order comes in, all parts, catalogued in some numerical arrangement, can be obtained at once and need only be assembled on the site according to plans which are equally readily obtainable.

The individual parts and especially those belonging to the furnishing of houses can also be sold to outside clients and entrepreneurs. Royalties from their sales go to the Company, because it is the Company that provided the designs. It is quite possible that such sales will raise the turnover considerably. As soon as it has been proved that there is demand and that the Company is developing, contracts with firms can be drawn up increasingly profitably.

II. Multiple use of designs

From the rich material of years of experience and the study of traditional building methods of all civilized countries of the world, the best has been used for inspiration and tested for suitability in the historical and climatic conditions of to-day. After this study of tested traditions, old as well as current, the work of designing started. Its result after many attempts is a series of designs for houses of different categories which contain the sum total of all practical, technical and aesthetic experience. They now seem suitable to establish exemplary standards for quality production in varied forms.

The designs must be ready in every detail to be used on the site, when the Company starts operations. As in every other type of industrial standardization, large turnover will be the means of profiting from the long period of preparation of the designs and the intellectual effort contained in them and their practical and technical ideas. Moreover, they will be of value to many, not just to a few. Large sales allow for low prices of the individual products in spite of high accuracy of execution.

The guiding idea of the Company is to be that comfort is not obtained by overdone bogus-splendours, but by clear spatial arrangements, and by the conjunction and selection of tested materials and reliable techniques. It is in this field that higher excellency will be offered and confirmed by guarantees granted over several years. For it is exactly here that the Company believes to be able to establish and maintain its reputation.

All types of houses, variable in size and arrangement, and variable also, as has been described, according to the wishes of the client, are ready with all drawings, estimates and detailed specification of necessary parts. The houses as designed are independent, coherent organisms not tied to any site, devised to fit the needs of modern civilized man in any country, not even only Germany. Interchanges between civilized nations are growing with the growing facilities of traffic. The result of this is the establishment of new international needs and a unified direction in all vital questions. National costumes tend to disappear and fashion is becoming a common factor in all civilized countries. In the same way there is bound to be a common convention in housing transcending national frontiers.

All designs for houses and their parts must be registered. Even if imitations were to appear, however, they could not do damage, because of a cheapness, reliability and reputation which could not easily be emulated.

To satisfy the changing needs of the public, the Company has prepared detached houses of different types and sizes from the working-class house to the upper-class villa. They will be put into operation according to demand. The advantages of detached houses need not be reiterated. Everybody wishes to own property. The strength of this wish even among the poorer classes is demonstrated by the allotments round our cities.

Modern industry has for a long time recognized the importance of working-class housing. Indeed, by the initiative usually of private companies more and more working-class estates are appearing in Germany. Their number and development in the near future is, as far as one can foretell, going to grow enormously. Experience collected for decades in English, American and German working-class housing has been used by the Company in the preparation of its designs. With the help of the principle of industrial production it can thus offer the possibility of building working-class cottages of high aesthetic value and good workmanship at minimum cost and in the shortest time. The advantages of the principle of industrial production are particularly obvious in working-class housing; for clients who are manufacturers or owners of large agricultural estates will as a rule need not one house but larger numbers. It is evident that the largest number of houses built at the same time and with the same parts will result in the cheapest price. This even applies to the wages of foremen, etc., and other overheads, since they can be set against not one house but many erected at the same time. As cost is a primary factor in putting up working-class estates, the Company is, on that score alone, going to be superior to those erecting individual houses with the services of individual craftsmen and solely when opportunities offer themselves.

---

* For example, one may assume that one house has twenty doors of the same dimensions. Even if the turnover were only 30 houses a year, 600 doors of the same dimensions would be used, without considering possible sales to outside builders. The Author.

† This was reported in *Building News* XCI, 1906, p. 249. *See* P. Collins: *Concrete*, 1959, p. 90. The Editors.

The second group of designs is larger detached houses.

For the wealthier urban population, manufacturers, professional men, merchants, etc., who want to have houses of their own and who can spend some 25,000 to 50,000 Marks on them,* there is no possibility except in England to get a house of good workmanship and with the space and comfort that can be obtained, if one is ready to live in a flat. They must put up with the hygienic and aesthetic defects of flats as speculative builders offer them, or with small, primitive detached houses which have much less space than the flats in the towns.

By means of the multiple use of the same designs and of the industrial production of parts the Company is in a position to satisfy these large groups of clients and offer them a good and aesthetically well-organized house of six to twelve or even more rooms with all the comforts of the modern metropolis for a capital corresponding to the rents they have at present to pay for flats.

There is also a public which wants houses in the suburbs, but has not as much capital as the previous groups, or can, for some reason, not settle down for a long duration. The Company caters for this public by offering designs for semi-detached houses or detached houses of several storeys for the use by two or more rent-paying families. The advantages of the detached house can be preserved, even if it is planned to consist of a small number of flats, and rent takes the place of ownership. Special care has been taken to separate tenants as completely as possible.

In these cases the Company's clients are not the tenants, but entrepreneurs who would regard such a house in a suburb close to the centre as a good investment. For, thanks to the principles of industrialized housing, these houses are so cheap that, thereby alone, they guarantee a good income from rents. quite apart from the advantages of good workmanship and comfortable fitments and furnishings.

For the largest types of the houses there would be, according to location and if a need can be established, the possibility of simplifying the economic running by centralization [of services*]. Since for town-dwellers with their nostalgia for nature the idea of a garden is always tempting, the Company proposes to undertake the provision of a garden for every one of its houses. Although each garden is an individual case, if only for reasons of the contours of the site, and, therefore, repetition in quantity from one and the same design it out of the question, the provision of gardens yet appears important as a publicity asset. Moreover, certain principles and certain formal details can be laid down, according to which in each case the garden architect employed by the Company can easily work out a plan suitable for each particular house and site.

III. Architectural unity for estates

It is likely that the Society will make sufficient profit from the sale of such detached houses. However, it will also be desirable, taking into consideration the appearance of a town as a whole and also higher profits, to lay out and build coherently larger estates inside and outside a town. This could be done under contracts with entrepreneurs.

For estates outside the town, where transport conditions must be a determining factor, the multiple repetition of detached or semi-detached or terrace houses for one family or several families would be the programme, in the manner of similar English estates, but with all the advantages of good workmanship, taste and comfort which it is the programme of the Company to offer. The visual treatment, the beauty and intimacy of inner courtyards which our age has lost, though southern countries still possess it, will be emphasized especially and similarly the treatment of corners, of the middle axis of buildings and of the surrounding gardens.

The principle of creating coherent streets out of rows of identical houses can also be applied to blocks of flats in cities. Here in any case a type, though not a good one, has recently been developed, as regards the plan as well as the elevation with the never ending pairs of bay windows. Only, builders hide the identity of forms under an unjustifiable mess of stucco and bad ornament, instead of drawing the logical conclusion and aiming at complete repetition which would be of enormous economic advantage. The price of mass-produced terraces of flats must, of course, be considerably lower than that of detached houses, since to build on a large scale in one place and at one time with identical materials and parts being taken to the site must be a great saving.

In the case of the largest types of such blocks of flats one could again, where opportunity arises, think of simplifying the running by means of centralization [of services].

The building of large estates could be done on behalf of other companies and big financiers. According to available capital either a large number of houses could be built as a speculation and then sold to a bidder (which would result undeniably in the quickest service to the public and the lowest prices), or the site could be laid out and divided up into plots according to the plan of the Company and the plots then sold individually as demand arises.

Whenever an adjoining block is tackled afresh, new building types will be used, both for aesthetic and practical reasons. However, quite apart from that, each plan type allows for innumerable combinations of the parts so that there is none of the danger of that uniformity which is so typical of English suburbs.

The sites are to be prepared even before the houses are built. Gardens also and walls and fences are to be provided in advance. By means of an early planting of trees and by their grouping each garden is to appear completely separate from its neighbours. Thus the public will be at once attracted by the beauty of the gardens and the unity of the whole estate and its rentability will increase accordingly.

The organization of sales

I. Commercial principles

So far the products have been explained. Selling them is proposed to be handled in the following way. To protect an enterprise against competition, it is important to establish sound commercial principles for the selling of the products, principles surpassing those of competitive enterprises. Several significant advantages result *per se* from the idea of the present enterprise.

By mass production in factories and mass consumption of its goods the Company is in the advantageous position to offer its goods, in spite of their best workmanship and excellent materials, so cheaply that the goods of competitors made singly and by hand cannot keep pace with them either in quality or in price.

Moreover, it has so far been the worst evil for the client that it was impossible to fix in advance exactly what a building will cost. It is well enough known that a client from the beginning calculates with costs exceeding the estimate by 20 per cent and that even this tacitly accepted figure is often exceeded. This alone prevents innumerable people from having houses built for themselves. The Company is capable of fixing in advance and with absolute certainty the total cost for each of their houses, since experience gained in previously executed projects is a guarantee of no detail being forgotten in the estimate, of all parts being purchasable from factory stock at fixed prices, and of all types of parts chosen by the client being entered with their prices at once in the printed estimate for each project. The varying costs of transport from the factories, of wages and materials are written into specially provided columns of the estimate according to current prices in the relevant part of the country. The Company gives a guarantee that the estimate will be kept.

Similarly, the Company will be immune against another evil in the building of houses, the loss of time and especially of interest on capital caused by the time taken over drawings, sub-contracts, etc. All designs are ready, all bye-law permissions granted, all parts ready to be delivered. Thus the Company can execute orders with little manpower and at a speed inaccessible to competitors and thereby prevent losses of time and especially of interest on capital.

II. Organization

These are the commercial principles of the enterprise. Its internal organization is planned to be as follows:

The whole organization will be conducted by a board of directors responsible for artistic, commercial and technical departments.

The function of the art department is to design types and parts, site plans and layouts for gardens and to specify materials and methods of construction.

The techno-commercial department is responsible for the running of the business. It deals with advertising, with the client whose individual wishes must be matched against the variable items of plans and parts, with the sale of houses or perhaps sites and, when an order has been placed, with the ordering of materials and parts. Nearly the whole correspondence can be reduced to printed forms, and the filling in of numbers from catalogues and of quantities. Dealings with suppliers, the making out of contracts and necessary journeys also belong to the responsibilities of the commercial department.

The art department has at its disposal a design office which is entirely separate from the commercial offices. Here the products are developed according to basic ideas and types, i.e. new types of houses are created and parts improved in accordance with technical progress. Gardens are also designed in the design office and sites are planned. The art department in developing designs consults the commercial department and takes advantage of its experience gained in dealing with the public.

Once a design is ready it is handed on to the central commercial office which looks after sales. This central office undertakes all correspondence, all accounting work and all advertising.

As a help to the central office branch offices will be established, when the growth of the Company justifies them. The head of each of these branches is a man of commercial experience. He is to get orders and to represent in his own region the commercial directors, all the while keeping in close touch with them. If necessary he can have by his side a manager of the building enterprises in hand. The number of such branch offices will grow as the Company grows. As soon as possible there should also be foreign branches. Designs, however, are issued only from the centre.

In all offices, apart from ample catalogues and illustrations, there are to be samples of materials and parts.

The internal organization of the business is supported by equally well thought-out advertising. On this, especially at the beginning, depends the number of orders necessary for financial success. The aesthetic intentions of the Company must be expressed powerfully in its advertising.

Well-designed leaflets illustrating and describing the various types of houses and pointing out their advantages for the purchaser are to be printed in large editions.

In order to make the public aware of the idea of the Company, shorter leaflets or articles in important journals will be issued. They should be written by well-known economists or journalists.

Public lectures with lantern-slides should also be held. The achievements of the Company are to be shown by travelling exhibitions in museums or other premises suitable for exhibitions. The types of houses should appear in models and plans. In addition, samples of parts and furnishings are to be on view so that the practical advantages, the high quality of materials and workmanship and the consistency of the style throughout can be demonstrated.

Posters announcing exhibitions are also to be produced by the design office. They are to be of high artistic distinction in order to convey at once the character of the enterprise.

The best handling of publicity is, as has been said before, of the greatest importance to the enterprise. For in contrast to other building enterprises overheads hardly change when turnover increases, and so every order taken after overheads have been paid for can be regarded almost entirely as profit.

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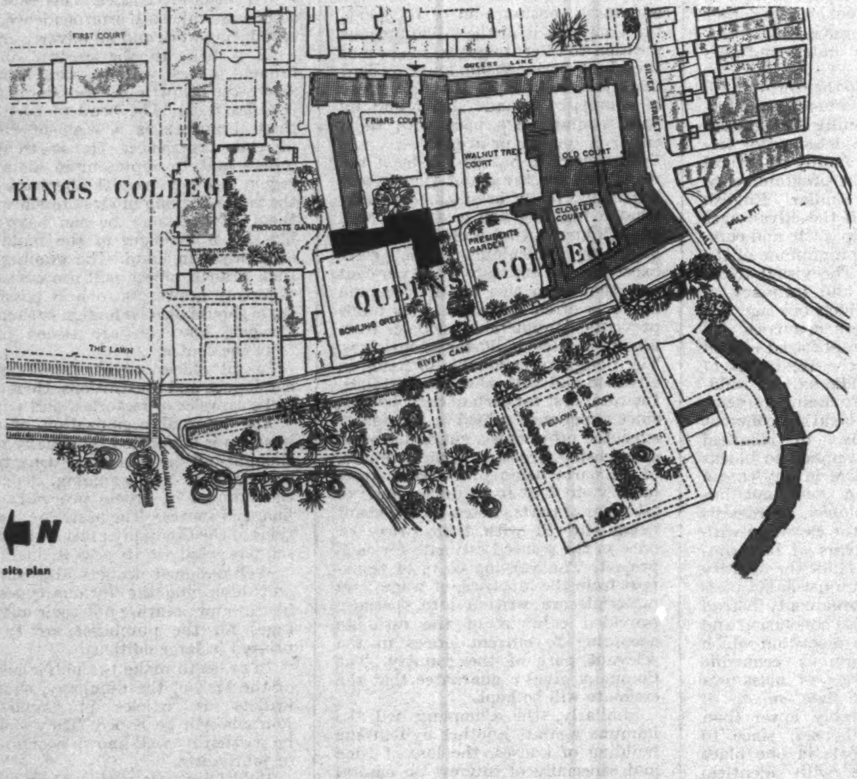
* This, in 1910, represented £1,250 to £2,500. Voysey's *Holly Mount* at Knotty Green near Beaconsfield cost £1,429 in 1906. The Editors.

* Editors' addition.

1 *(facing page), the building from the south-west.*

current architecture


FIRST COURT
QUEENS LANE
FRIARS COURT
WALNUT TREE COURT
OLD COURT
SILVER STREET
KINGS COLLEGE
PROVOSTS GARDEN
PRESIDENTS GARDEN
CLOISTER COURT
QUEENS COLLEGE
BOWLING GREEN
MILL PIT
THE LAWN
RIVER CAM
FELLOWS GARDEN
N

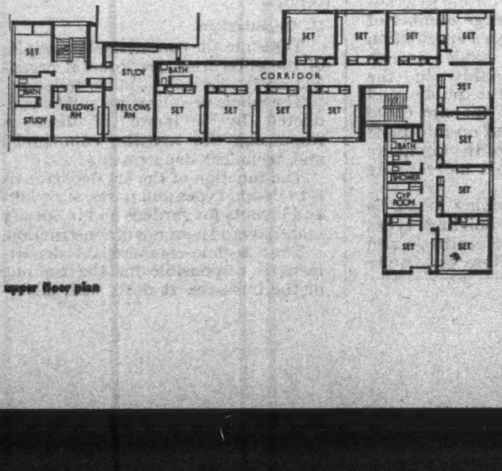
site plan

UNDERGRADUATE ROOMS: QUEENS' COLLEGE, CAMBRIDGE

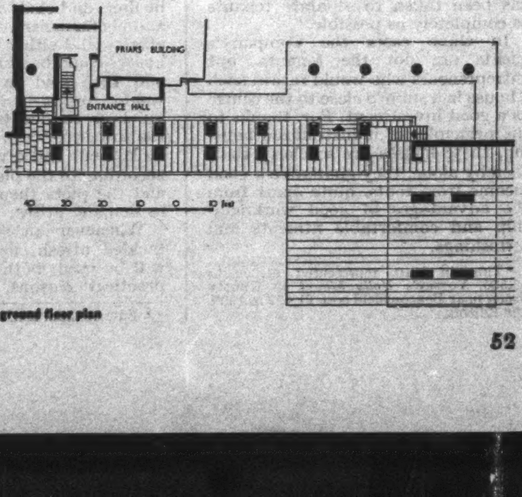
ARCHITECTS: BASIL SPENCE AND PARTNERS

This addition to the existing college buildings is on a very restricted site between the Victorian Friars Court and the fifteenth-century Fellows' bowling-green. It contains 43 undergraduate rooms and rooms for two Fellows. The accommodation is on three floors, raised on columns and brick arched piers with a flat roof-terrace. Access is by two staircases, one rising direct from the open undercroft and the other from an enclosed entrance-hall. The building is designed to enclose and complete the south-west side of Friar's Court, while preserving the open view through the brick arched piers and across the bowling-green to the river Cam. The south-west wing projects to enclose the bowling-green, and provides shelter for the York stone-paved terrace at a lower level, which is designed for use during May balls and other college occasions.

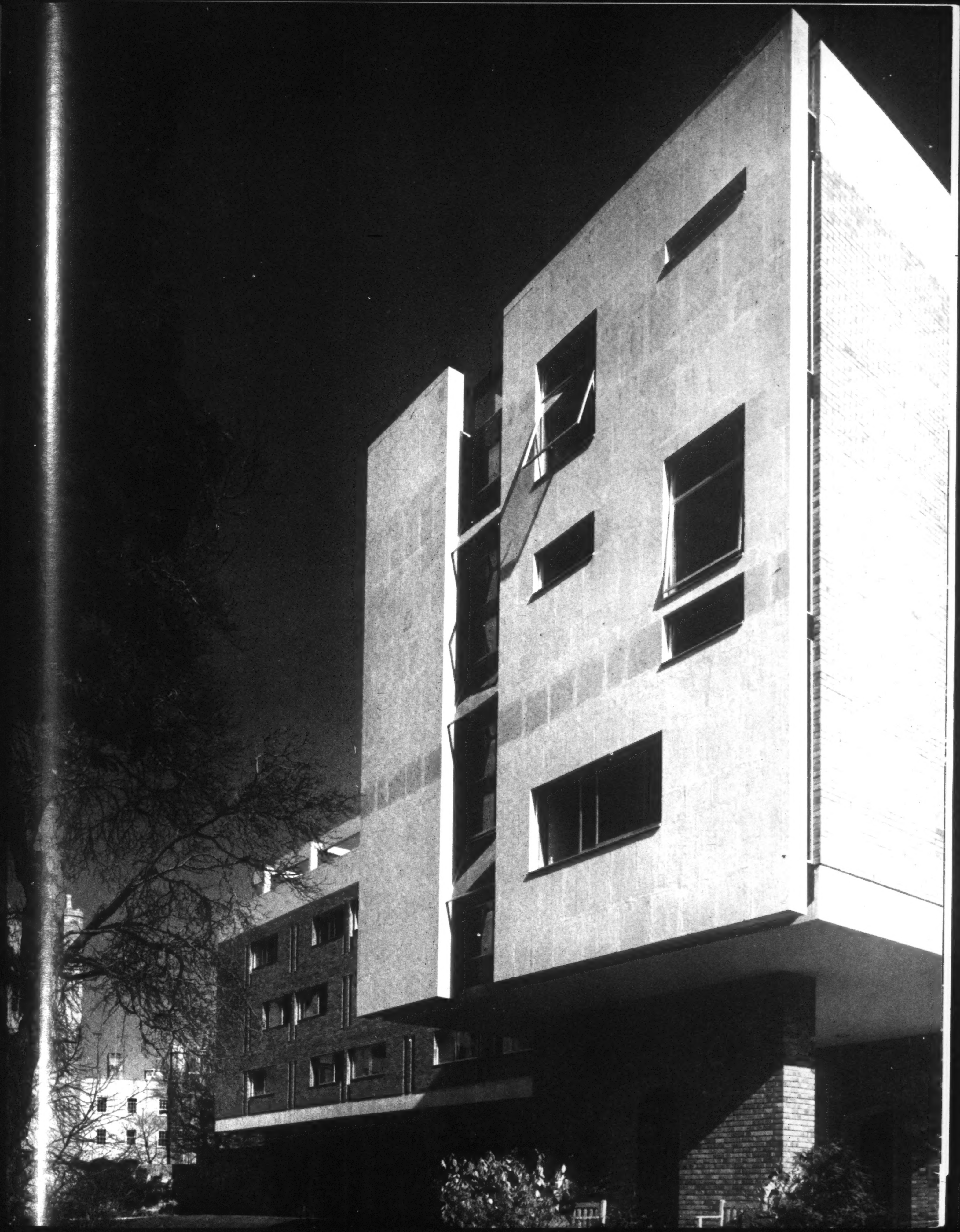
Construction consists of a reinforced concrete cantilevered slab at first floor level supported on brick arched piers and bush-hammered reinforced concrete columns and, on the upper floors, of reinforced concrete slabs supported on 9 in. brick cross-walls between each room. The lower brickwork is faced with red-blue bricks. The cavity external walls to the upper floors are faced with yellow-brown Stamford stone facing bricks. Windows to the study-bedrooms are of anodized aluminium, sliding horizontally. Heating is by small-bore hot water radiant panels and convectors in each room, supplemented by electric fires.


SET
STUDY
BATH
CORRIDOR
FELLOWS RM
FELLOWS RM
SET
STUDY
BATH
SHOWER
GYP ROOM
SET

upper floor plan


FRIARS BUILDING
ENTRANCE HALL
40 30 20 10 0 10 feet

ground floor plan



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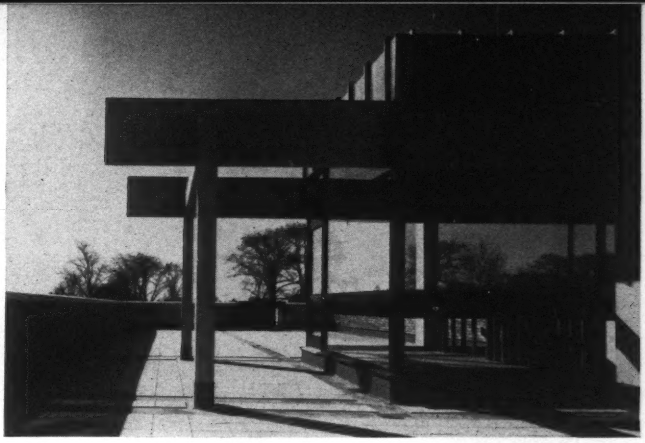
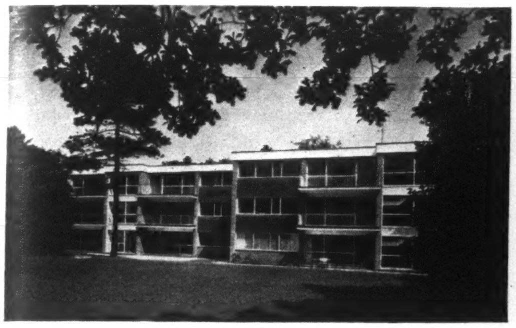


5

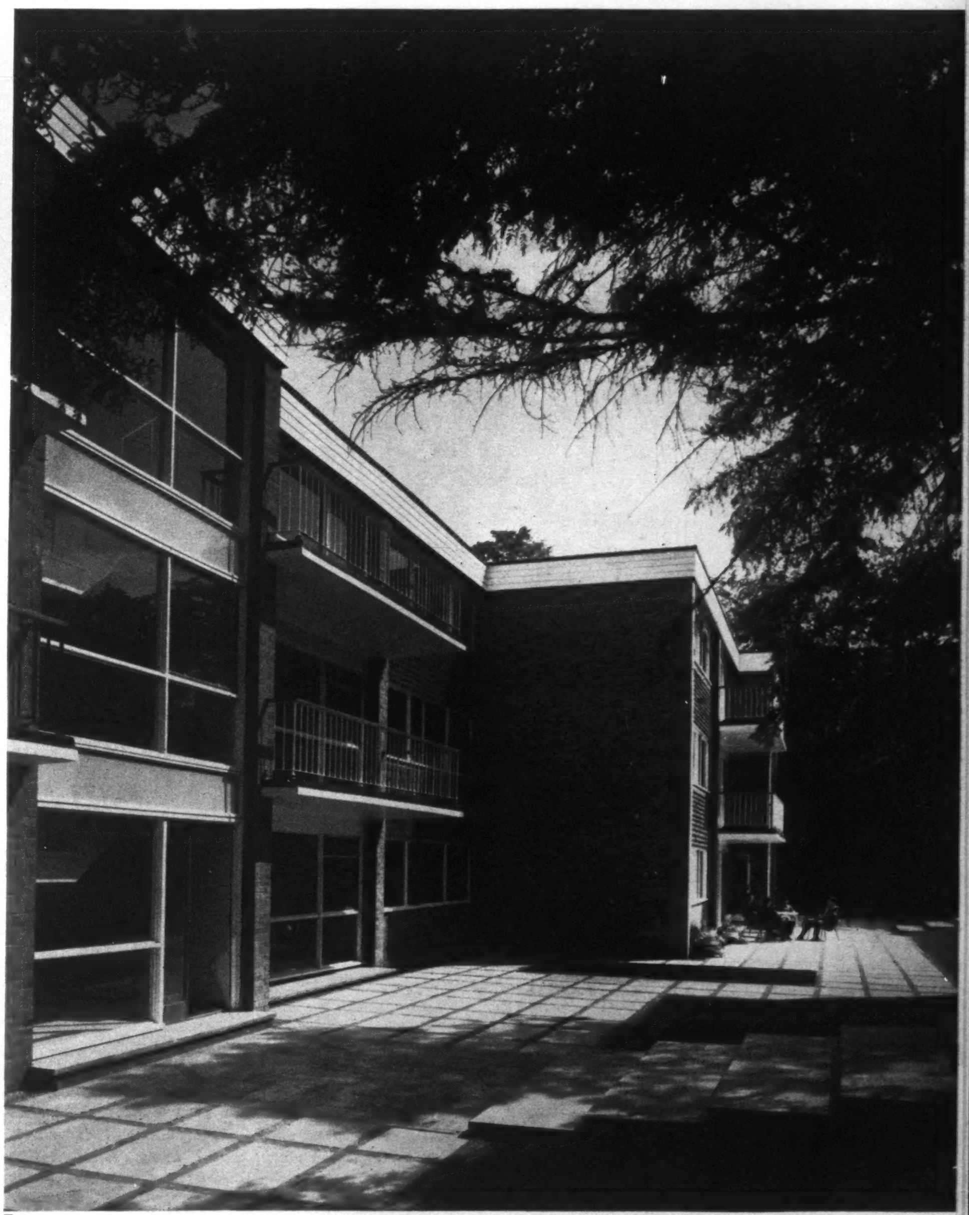
Facing page: 2, from the river-bank, looking east; 3, inside the open ground-floor area, looking towards the Friar's Building. 4, the south end. 5, the roof-terrace.

Undergraduate Rooms, Queens' College, Cambridge



6

6, distant view of the balcony elevation; 7, close-up view.



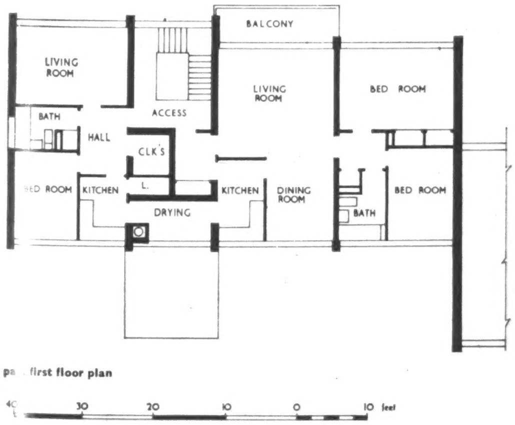
7

FLATS AT EDGBASTON, BIRMINGHAM

ARCHITECT: JOHN H. D. MADIN

Privately financed flats on part of the Calthorpe Estate, in well planted gardens at the junction of Norfolk Road and Augustus Road. The scheme consists of two three-storey blocks of 12 and 18 flats respectively. The flats vary in size from one- to three-bedroom.

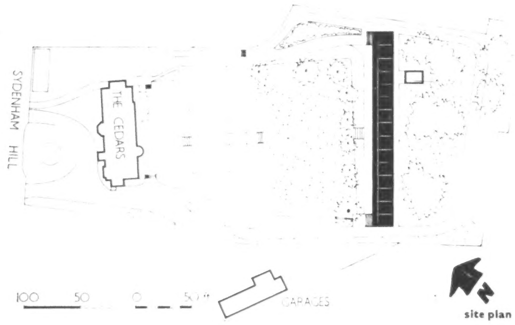
They are of cross-wall construction, with concrete floors and insulated timber roofs. Panel walls are faced with brick on the ground floor and tile-hanging above. Windows are timber framed with metal opening lights. The flats have electric under-floor heating.


BALCONY
LIVING ROOM
LIVING ROOM
BED ROOM
BATH
ACCESS
HALL
CLK'S
BED ROOM
KITCHEN
L.
KITCHEN
DINING ROOM
BATH
BED ROOM
DRYING
40
30
20
10
0
10 feet

part first floor plan

TWO BUILDINGS FOR THE SALVATION ARMY

ARCHITECTS: C. WYCLIFFE NOBLE AND PARTNERS



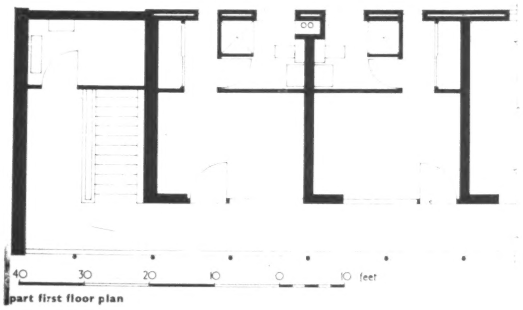
site plan

1. Annexe to Officers' College, Sydenham

An annexe to a large Victorian house on Sydenham Hill, built at the end of its garden. There are fine trees on the lower part of the site. It is divided into 26 'cells,' each comprising bed-sitting-room, dressing area, shower and lavatory. Each ground-floor cell is reached direct; first-floor cells are reached from an access balcony. The existing house contains the rest of the college accommodation: lecture-hall, library, lounge, offices, dining-hall, etc.

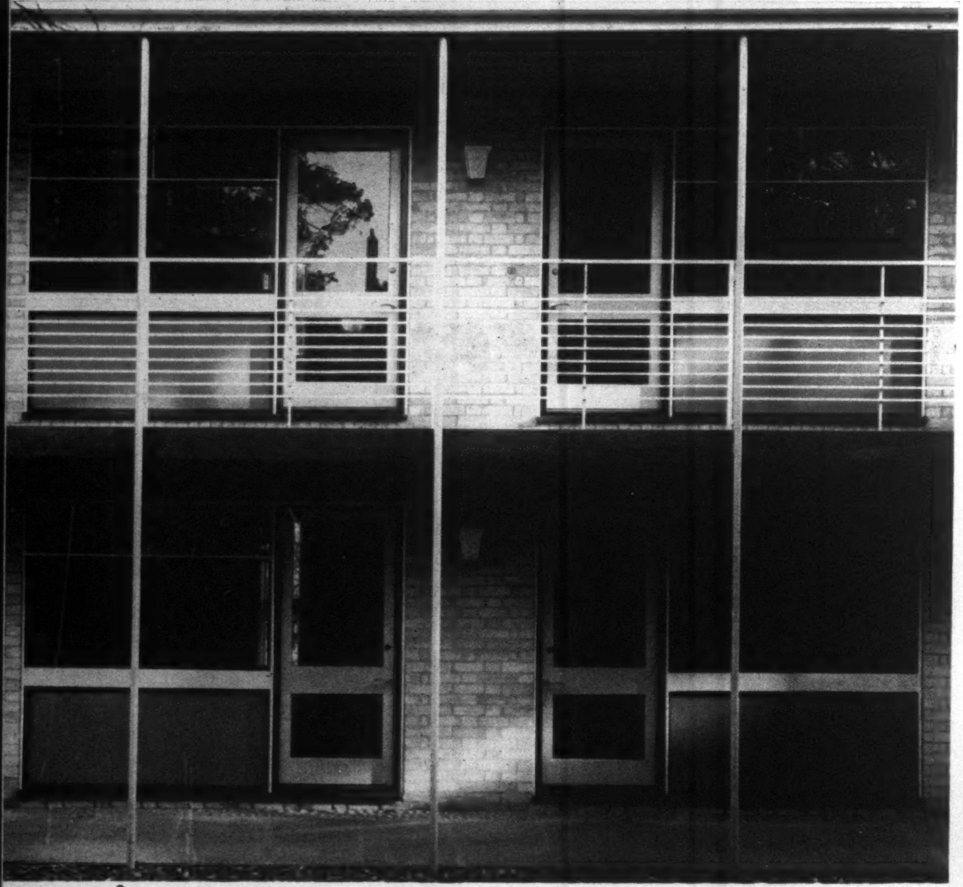
Construction of the annexe is brick cross-walls, with continuous reinforced concrete floors and beams. Finish materials are similar to those of the existing house: pale yellow gault bricks and Welsh slates, together with oiled teak and white-painted metalwork. Soffits to eaves are of V-jointed polished pine boarding.

The annexe has been designed in association with Col. W. H. Charles.



part first floor plan

8



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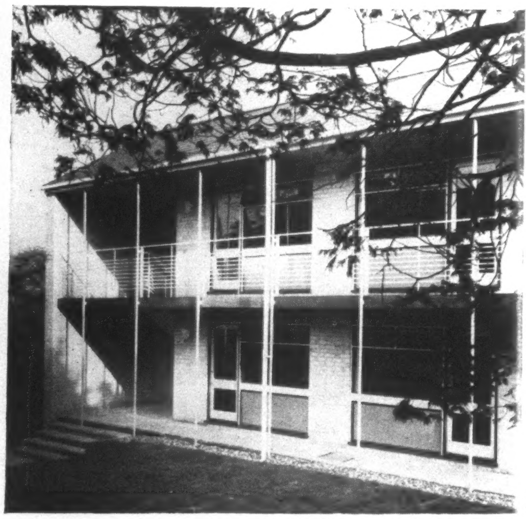
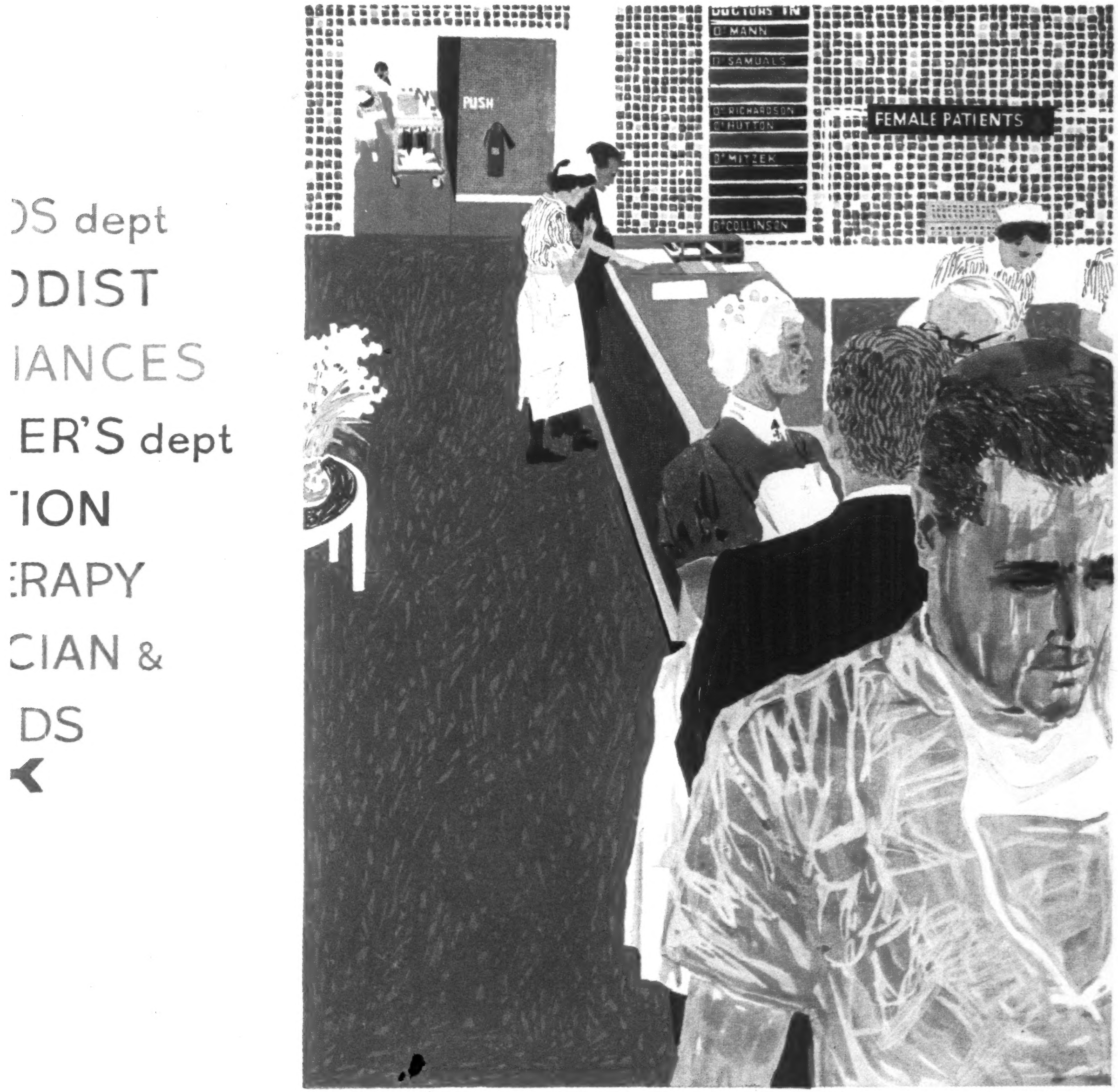


10

8, from the old house, showing the annexe set in Victorian planting. 9, close-up of the north elevation; the concrete balcony has an oiled teak fascia, with V-jointed polished pine soffits to eaves and a horizontal square bar guard rail. 10, the north staircase end.



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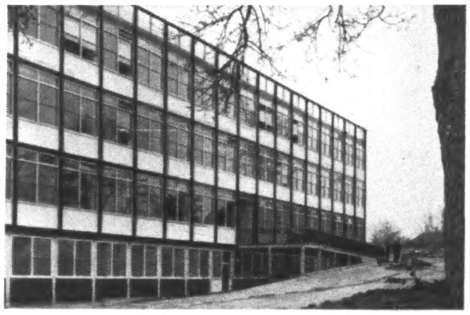

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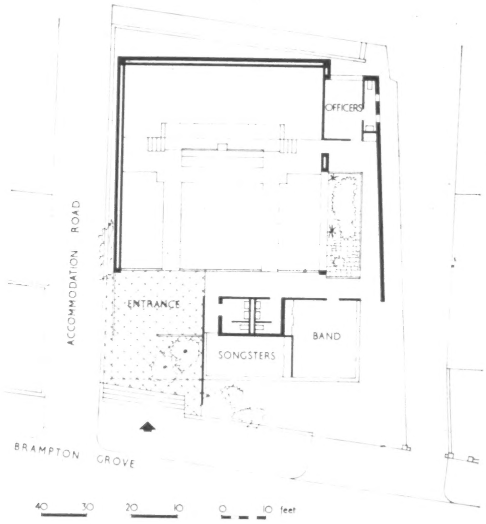
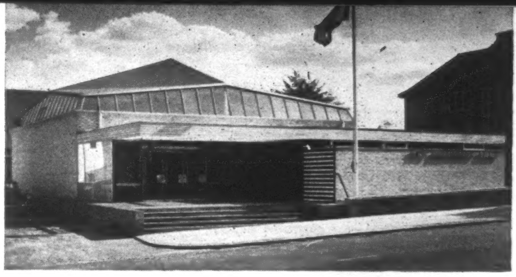
Two Buildings for the Salvation Army



ground floor plan

11



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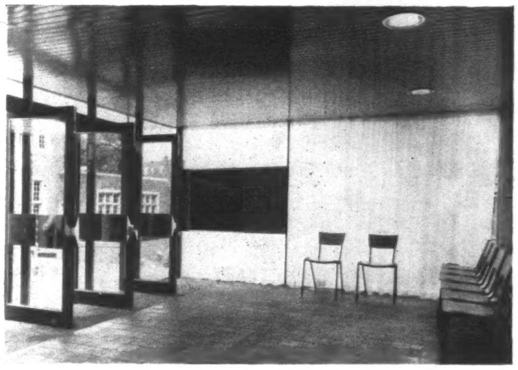


11, the exterior from Brampton Grove.
12, the entrance hall.
13, the Hall of Worship; the walls are of yellow brick and the roof is unstained Makore and Missanda with a natural acoustic plaster dome.

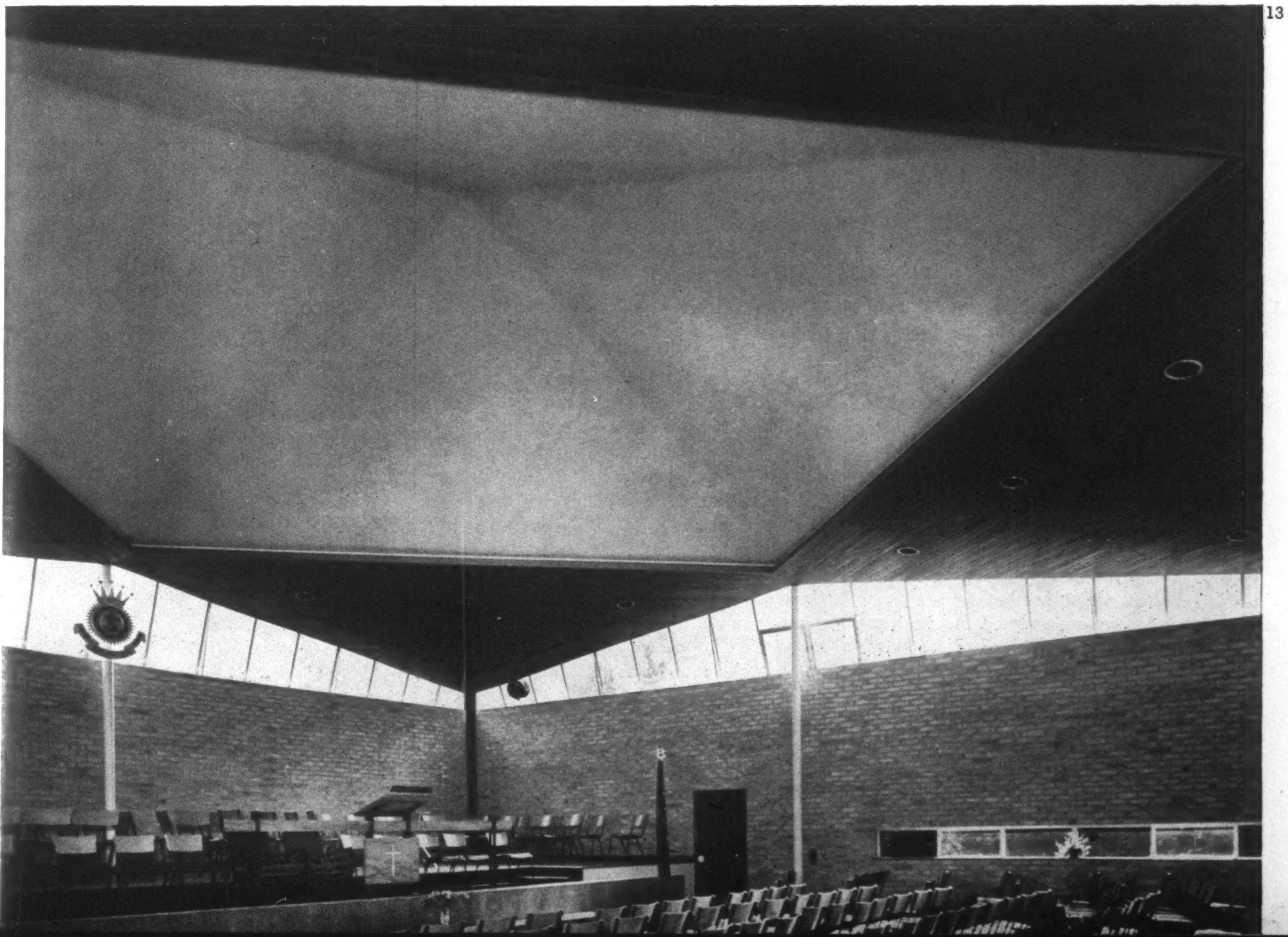
2. Citadel at Hendon

The building consists principally of a Hall of Worship, designed to answer Salvation Army requirements: namely that it should be a simple meeting-room, where the pattern of worship does not demand visual concentration on any focal object, nor are there religious rites performed before the congregation, the service consisting of extemporary prayer and singing and teaching from the scriptures.

The hall is square on plan, with a raised platform for the band and choir. Between the platform and the congregation is a Mercy Seat, where penitents kneel, of solid elm. The hall is enclosed by four panels of yellow brick and covered by a steel-framed roof supported at the four corners of the building by 10 in. square flanged steel columns. There are secondary circular posts at the apexes of the roof panels, which are lined with unstained makore wood.

The centre dome is carried up from these panels and is lined with acoustic plaster.

13

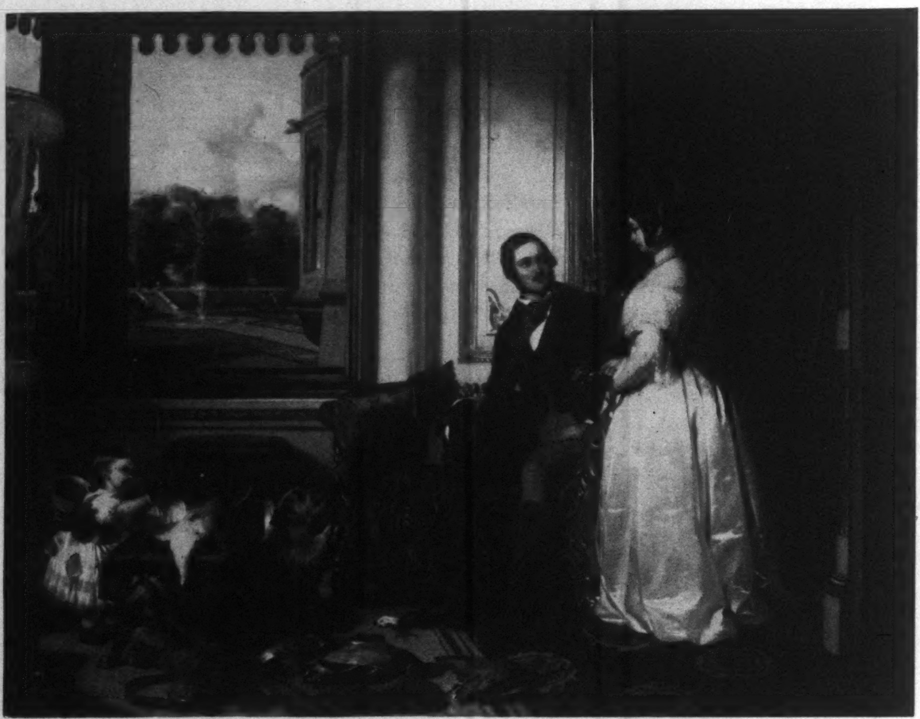


EXHIBITIONS

PAINTING

If a stag could have been looking through the window of the hardgloss set-piece called 'Windsor Castle in Modern Times,' 1, in which Queen Victoria, the Prince Consort and the little Princess Royal share the Green Drawing Room with Eos, the greyhound, Dandie, Islay and Carnach, the Skye terriers, and several items of dead game, the picture would have been a catalogue of Landseer's main interests both as man and artist. He was a very talented animal painter, but his talent did not serve a compulsive vision, and I feel sure that he felt no prick of artistic conscience when he began to specialize in painting the animals, alive and dead, hunted and petted, which were the chief preoccupations of High Society. Successful Royal Academicians are born, not made, and Landseer was one of the most successful of all because he was able to reflect the instincts and values of his noble patrons whilst preserving a solemn sense of his own importance. As he himself wrote in a letter to the Earl of Ellesmere, 'Who does not glory in the death of a fine stag?' And to explain his own delight in the killings he added: 'with all my respect for the animal's inoffensive character—my love of him *as a subject for the pencil* gets the better of such tenderness—a creature always picturesque and *never* ungraceful is too great a property to sacrifice to common feelings of humanity—How much I wish I could have been with you during your stalking days.'

1



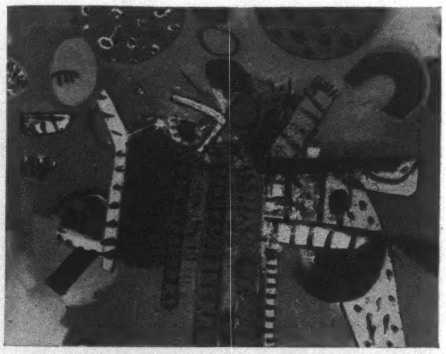
His art was first and foremost a remarkable social phenomenon, and he deserved to have a less squeamish exhibition dedicated to his memory than the one that was recently put on in the Diploma Gallery at Burlington House. The Royal Academy must be losing its grip, for its handling of this show practically amounted to an apology for its Victorian heyday. It's true that 'The Monarch of the Glen' was there, and 'Dignity and Impudence' and the one in which human beings are replaced by dogs in a monstrously ingenious trial by jury, but the exhibition should have been dominated by such things. If we had been *surrounded* by the noble portraits of stags, potent emblems of male domination, and the paintings of domestic pets, dedicated to the pathetic fallacy, which used to bring rich and poor alike to a state of deliquescence, the exhibition would at least have ministered to what Wordsworth called our 'degrading thirst after outrageous stimulation.'

As it was, the organizers managed to reduce the impact of the big machines by flooding the show with preliminary studies, oil sketches and unfinished works. It was a calculated attempt to invent a new and very sensitive Landseer whose genius was side-tracked by the demand of his misguided patrons for 'high finish.' But even the assistance of a small landscape which turned out to be a Constable couldn't alter the impression that Landseer had a neutral talent that never broke out of given pictorial formulae. The sketches were bound to look a bit fresher and more spontaneous than the set pieces, but he was incapable of inventing a pictorial truth, and it is only in the parts where he mingled observation with melodrama and whimsy that his work remains conspicuous.

The Landseer exhibition was almost a farcical demonstration of the present faith in anything that looks spontaneous. Professor Wind contends that this faith not only encourages a sophistry of production, peculiar to our time, 'by which each work, no matter how laboured, hopes to give the impression of being freely improvised,' but, more seriously, tends to prevent the artistic experience from running its full course.

There is something in what he says, but the instances he gives of our dislike of highly finished works of the past do not throw much light on our present conception of improvisation. He is quite right when he implies that most of us prefer the full-size oil sketch of Constable's 'Leaping Horse' to the two 'finished' versions. We prefer it because, like the work of the moderns, it is made of undisguised paint marks. But Constable's 'finishing' process involved a reference back to the scene from which the sketch was derived, and the substitution of more descriptive textures for the naked paint marks: in the case of a typical contemporary improvisation however there is no model which can be referred to for further information. One could only 'make-up' the kind of finish Professor Wind has in mind.

Alan Davie's recent exhibition at Gimpel Fils was a brilliant demonstration of the improvising faculty at work. Some of the new paintings are rather different from earlier work in that the point of departure is not an automatic sweep of the brush, but a simple pictograph of an object—it might be a chair, a building or a hobby-horse—which functions as a kind of target. The hobby-horse, for



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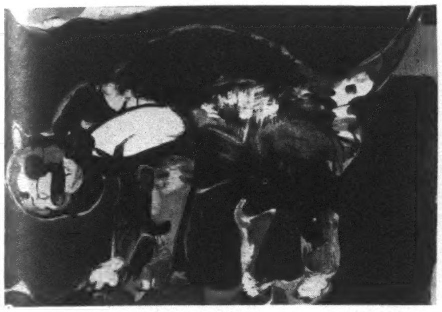
instance, 2, is attacked in the most 'vulnerable' part of its anatomy, as if it were a bull-ring horse, and the artist a bull. The area in which the attack is concentrated becomes a rich, thick complication of marks which disclose a curious iconography of aggression and contrition. The stomach is opened up and the entrails pour out to provide the horse with a protective covering of gay trappings, and the orms which surround the hobby-horse ppear to be floating back after being urled out of the picture by the fury of the assault.

This insouciant marksmanship is a reminder of his avowed interest in Zen archery, and it might not be altogether fanciful to perceive in this attitude to painting an unavowed emulation of the quick-drawing gunman of the Westerns. All the arts are now on the side of Condorcet, who said, in reaction against Pascal's introspection, 'Man is born for action, as fire tends upwards and a stone downwards.'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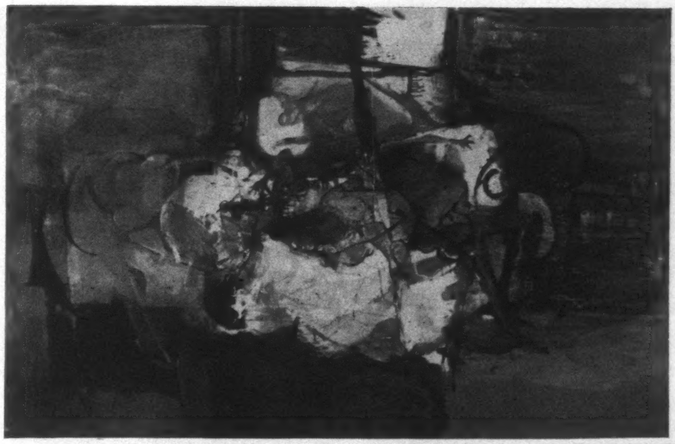
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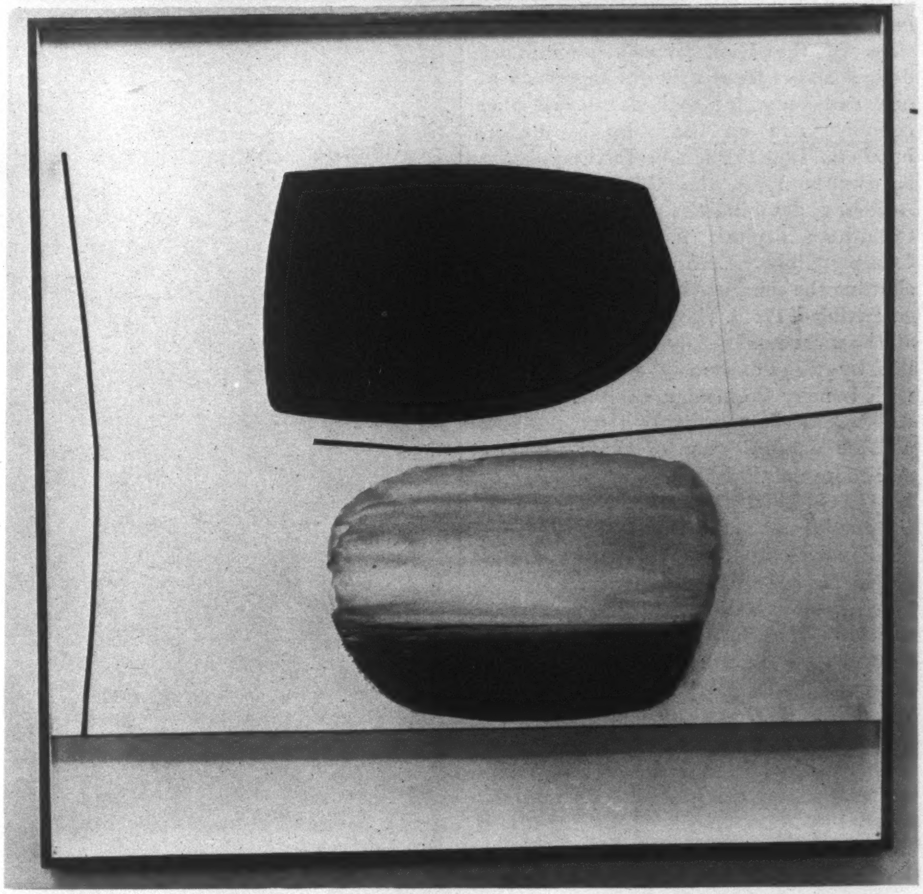
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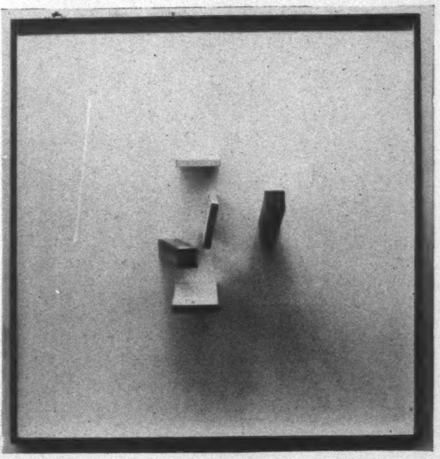
Reyberolle, who has just been holding a one-man show at the Marlborough Fine Art Gallery, is no less talented than Davie, but although he makes improvisatory gestures they don't turn into creative acts. As in the case of the recent work by Davie, he starts with an image—a drawing of an animal, or the head of a pipe-smoker, or a couple of nudes—but he puts a good deal more work into its preparation, and the paint textures never succeed in breaking it down. His pictures are essentially neat works which have been roughed up to give an impression of being freely improvised. His handsome school-of-Picasso cat, 3, is very much what he started out with. The intervening sessions with the brush have failed to dissolve the cliché. In the case of the lovers on the bed, 4, the paint has much the same effect as a thin partition between two hotel bedrooms, with the lovers rustling in one of them and everyone else being quiet in the other. It blurs the document without transforming it. I feel sure he intends his 'wild' use of paint to lift the picture out of mundanity and transmit a sense of the sublime, but it achieves only a prettification of frowsiness.

Victor Pasmore's improvisations are little sins against pure geometry, minute quirks which create an effect of elegant and refined aestheticism. They occur on such large, sanctimonious stretches of whiteness that, according to the temperament of the spectator, they either assume an air of immense daring or operate as blessed signs of frailty in a man whose uprightness might otherwise be intolerable.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In his recent, highly successful show at the New London Gallery I discovered two delicious works in which the quirks were somewhat larger than usual. In one of them a watery area of colour deliberately contrasted with the opacity of the rest of it actually provided me with the illusion of a seascape, 5, and in a construction, 6, one arbitrarily and absurdly cocked-up wooden projection brought vividly to mind the pink tilted noses that were so charming a feature of his early nudes.

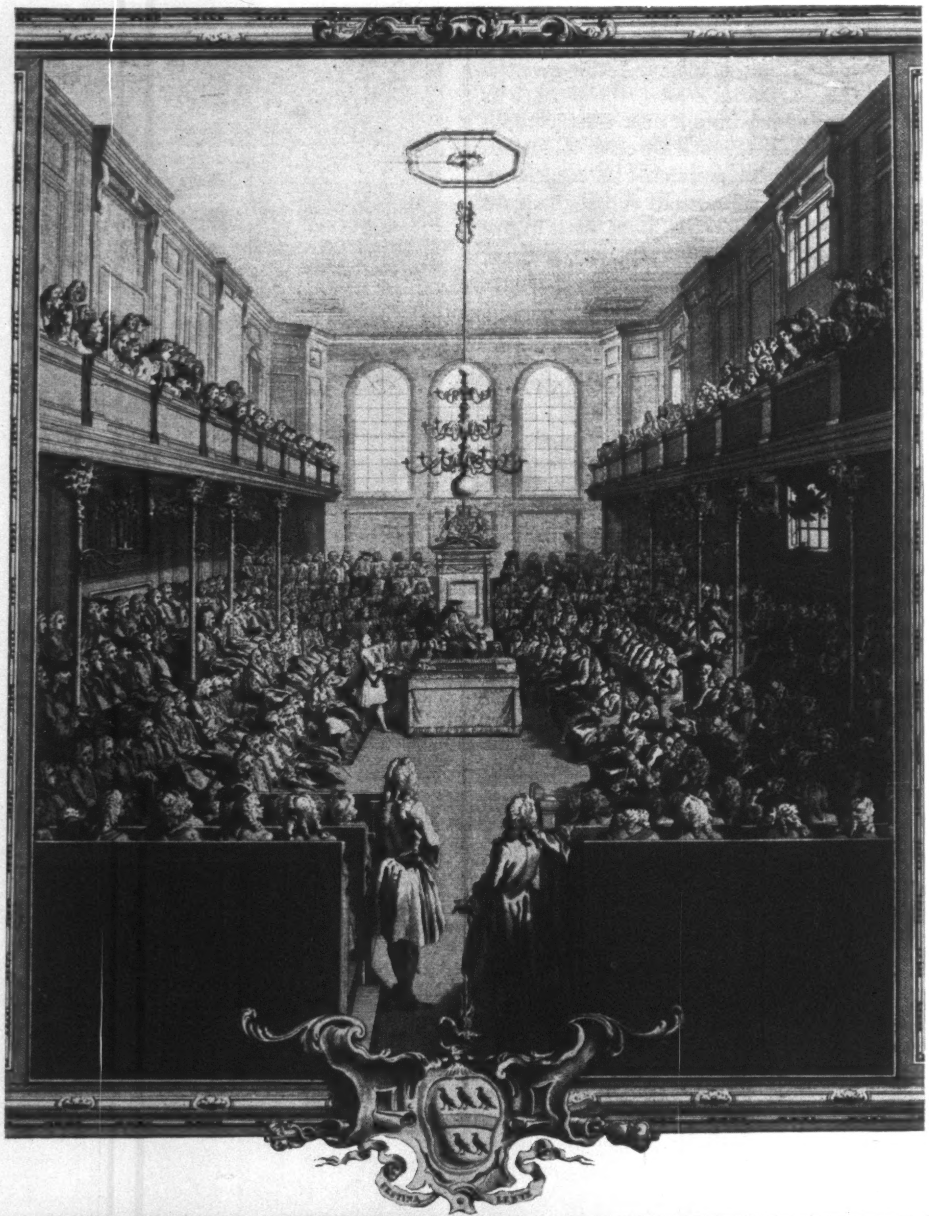
Robert Melville

HISTORY

CAST IRON COLUMNS 1706[1]

In 1706 *the influx of new Scottish members to the House of Commons demanded extra accommodation. The ensuing alterations, designed by Wren,* included the erection of galleries on three sides of the Hall. Wren's preliminary design[2] shows these galleries supported at one end only by orthodox Corinthian columns, and on the sides by underbrackets. That this is a preliminary design is confirmed by the Office of Works' Accounts, detailing the provision of eight Corinthian capitals to be supplied by Grinling Gibbons[3]. The earliest document showing the completed interior is J. Pyne's engraving of 1749[4]. The gallery is supported all the way round not by ordinary columns, but by thin, extremely attenuated ones with bunchy Corinthian capitals, 1. Karl Anton Hickel's painting of 1793[5] provides a more detailed view of these columns; and more detailed still is the painting by Sir George Hayter of 1833[6], 2. This shows the further alterations of 1800, when the thick medieval walls, both below and above the gallery, were cut away to provide accommodation for the new Irish members. The lintels across each newly formed opening were supported by thin columns. James Wyatt, the architect for this phase of alteration, can be assumed to have used cast iron for his columns[7]. This prompts the question, were Wren's columns also of this material, thus providing the earliest example of the use of cast iron as a structural member in architecture?

An examination of Hayter's painstakingly accurate painting shows the Wren columns of not more than six inches diameter. In purely structural terms a wood column of this thickness would seem to be insufficient support for galleries containing at least two tiers of seating. Whoever conceived the order



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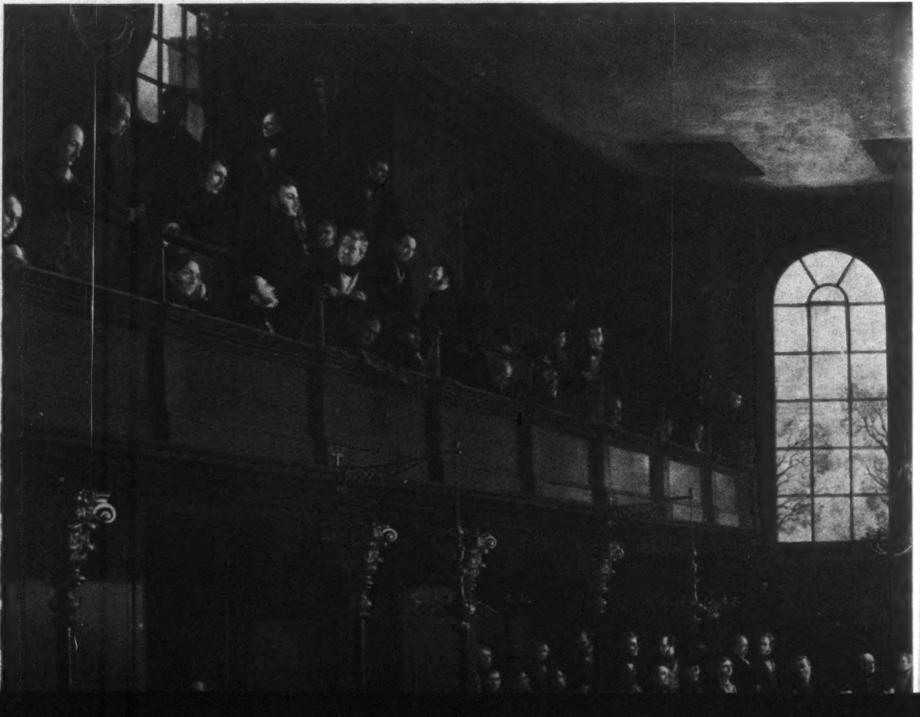

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[1] This enquiry was prompted by a conversation with Henry Russell Hitchcock.

[2] Wren Society, xii, pl. xxii (with wrong captions).

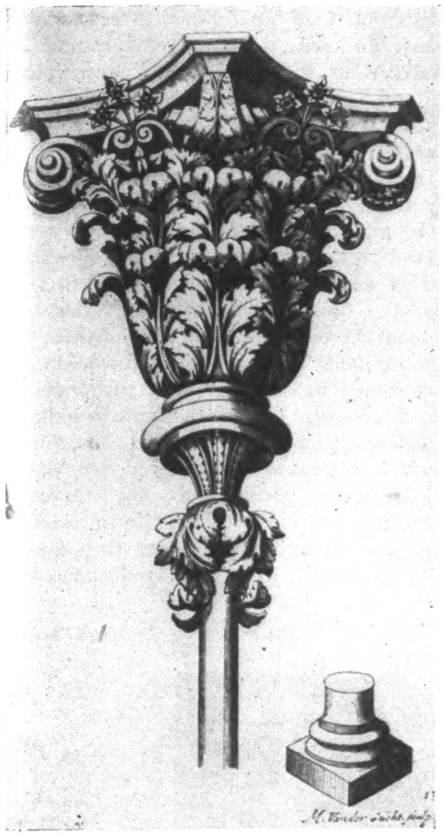
[3] E.351/3312. 1706. 'Grinlin Gibbons carver for 8 capitals by him made and put up at the House of Commons 32 £' 'Thomas Highmore Sergeant Painter for Gilding 8 Capitals and Painting the pillars.'

[4] Repd. M. Hastings, *Parliament House*, 1950, 132.

[5] Hastings, 134-135.

[6] National Portrait Gallery. Hastings, 136-137.

[7] Wyatt had used cast iron for floors, windows, and other structural purposes in Kew Palace (1802).



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designed capitals in proportion to the lower cornice of the gallery, combining them with grossly thin columns. In fact, proportions which are gothic rather than renaissance. This suggests the use of a material which is not only economical in terms of thickness, but which also provides a safe and functional support. Iron would fulfil these conditions.

One has not far to go for a precedent, if only in design. Jean Tijou, the great blacksmith, published *A Newe Booke of Drawing* in 1693. On plate thirteen he gives the very first depiction of an iron capital with column and base, 3. This is of such startling similarity to those executed by Wren that a direct relationship would seem probable. Tijou was one of Wren's craftsmen at Hampton Court and St. Paul's Cathedral and did not leave England until 1712. As his direct participation in this project is, however, excluded by the Works' Account, Gibbons may have borrowed this design from Tijou (who was one of his colleagues). That the capitals were carved in wood is not only supported by Gibbons's reputation in this medium, but also by the horizontal joining line to be seen in the nearest capital in the picture. This separateness of capital and column suggests that the latter may have been of a different material. Wren may well have conceived of this unusual combination in an effort to preserve the important space which would have been consumed by columns of normal dimensions. Thus, his empirical mind saw the value of Tijou's drawing.

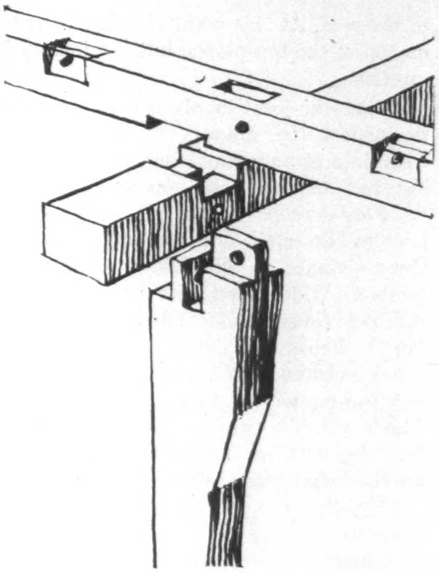
The earliest use of cast iron employed in this way was presumed to have been in 1752 at Alcobaça in Portugal, where columns were used to support a chimney[8]. From the 1770s onwards it appears in various structural contexts. There is no practical reason why columns approximately twelve feet in length could not have been cast in 1706. Not only are the cast iron railings both at St. Paul's Cathedral (1710) and the Senate House, Cambridge (1720s), quite high, but the casting of guns of great length was common practice before the eighteenth century[9].

Any evidence of Wren's remarkable innovation was destroyed in the fire of 1834. But does one recognize, in Mackenzie's painting of the destroyed House made immediately after the conflagration[10], the 'wilted' iron columns of 1706 or 1800?

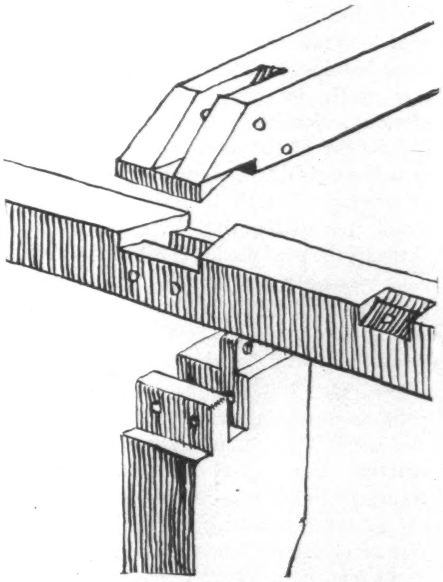
John Harris

THE DOVETAIL JOINT

In seeking evidence over some sixteen years for the assumption of an inaugural date for the dovetail joint, I have been engaged upon a survey of Essex farm-buildings. My hope was to elicit a dating system based upon joinery method, and recently a salutory example has come to light. Whilst I am anxious to observe the necessary degree of caution, it appears to indicate the period in which the dovetail-joint was adopted by structural carpenters. And it does, with tolerable certainty, demonstrate the constructional practice of carpenters before they did use the dovetail in roof-framing. Such a 'watershed' in structural history would be of enormous value to archæology, and to the study of the various vernacular architectures; since those ancient buildings which are most numerous in survival are usually the humblest in origin, and therefore most sparing in ornament—for long acknowledged to be the best yard-stick for dating masonry. I now believe it to be equally clear that the totality of joint-forms employed during the length of time which surviving examples of English timber-building will cover (an as yet unknown quantity) would provide an accurate yard-stick with which to date our secular timber-framed architecture; which has, for too long been quite inscrutable.



1, joinery involved and order of assembly in pre-dovetail method; the jowl of the post is in line with the top-plate.



2, joinery involved in normal dovetail assembly (late medieval); the jowl of the post is here in line with the tie beam.

There are in Essex two early medieval barns, one at Prior's Hall, Widdington, and the other at The Hall, Upminster. Some four years ago a striking reversal of assembly-order became apparent to me whilst surveying these two for scale-drawing. Both barns are of the aisled type; that is, have outshuts either side of the main structure, which enormously increases the volume of space covered by their timber roofs. At the eaves-level, which is the top-plate of the external walls, the order of assembly of the timbers is literally reversed. The tie-beam is first jointed to the wall-post of the transverse frame, and is then trenched, the top-plate is laid into this trench, and over a tenon on the standing jowl of the wall-post (see 1). This ingenious procedure dispenses with the lap-dovetail normally found at this point, the anomaly in both barns being that the normal order of assembly is observed at the tie-beams of the main-span of the roof. At this point the tie-beams lie on top of the top-plates, but the joinery is unusual.

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[8] N. Pevsner, *Pioneers of Modern Design*, 1960, 118.

[9] I am indebted to Mr. Raymond Lister for his opinion as to the practical application of cast iron columns and guns.

[10] Hastings, 138-139.

To see the joint involved it is necessary to inspect the granary of Prior's Hall, wherein a strange movement of the building has exposed one example—*a bare-faced lap-dovetail*—which it will be realized is a half-dovetail, and can only offer half the resistance to withdrawal of the true joint. At Widdington, therefore, we have a complete range of timber-buildings, including the house now dated at *circa* AD 1270 (after examination it would be unreasonable to assume that they were not co-eval) which exhibit two conceptions of roof-framing, with no indication of preference for the individual merits of either.

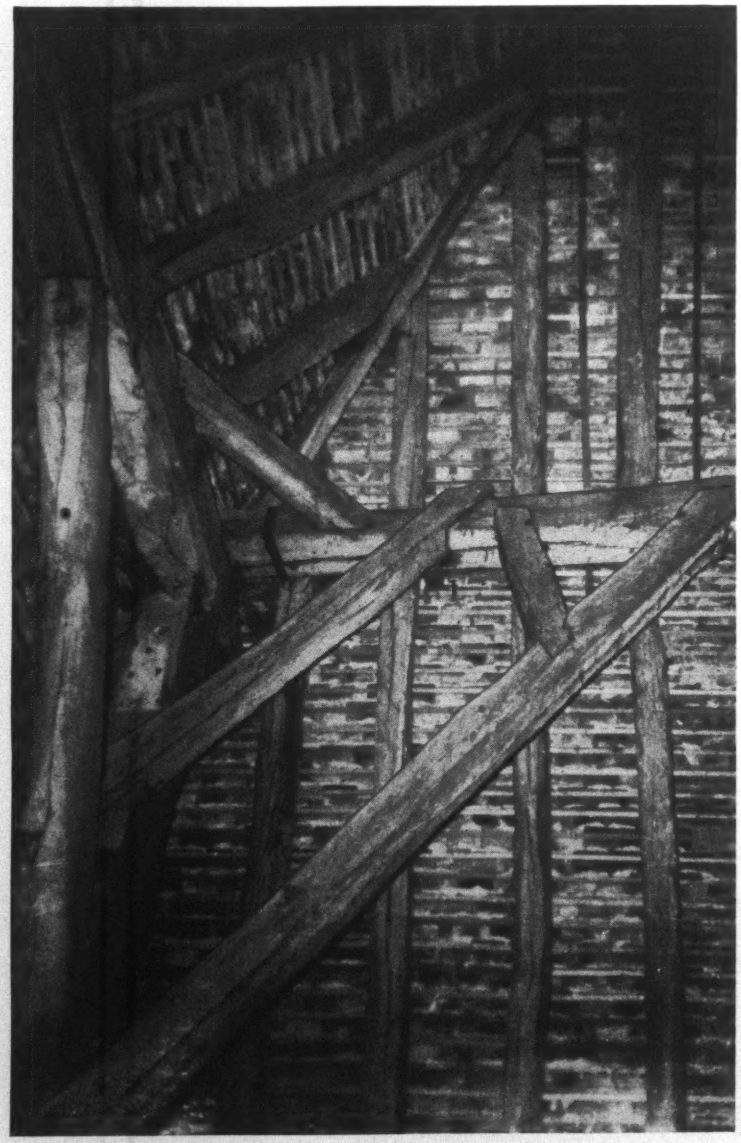
I feel that the only reasonable inference so far as the bare-faced lap-dovetail of the tie-beams is concerned, is this: that no carpenter, least of all a medieval one, would use the bare-faced form were he conversant with the logical form. Nor is it likely that, having done so, he would proceed to frame the outshut roofs with mere cross-halving, had he, in the first instance, any faith in his joinery-method. The obvious objection to the halved method at the height of the main-span tie-beams is that the outside cheek of the joint must be of adequate length to resist splitting off; which postulates that it must protrude through the roof-cladding into the weather. This was always done with the top-plates ends, and with the tie-beams mentioned, but in both cases they are out of the weather, owing to the verge-boards and eaves, respectively.

Since observing these examples I have examined two more barns which do embody the logical conclusion of this framing-method, and seem to indicate that the reversed assembly at the eaves was a last surviving feature of pre-dovetail structural tradition. These barns stand at the Hall, Belchamp St. Paul's, which implies some tenuous connection with the celebrated St. Paul's Domesday of the twelfth century. Both these barns (they have each been extensively rebuilt) still contain transverse frames which are quite innocent of the dovetail; or even anything resembling it. Two of them are half-hip end-frames, but the others are free-standing bay demarcations, and the tie-beams in these latter instances are first 'down,' and carry the top-plates in a trench; the objection which I had always foreseen to such a logical conclusion being quite circumvented, because the rafters of both flights only contact the upper, external arris, of the top-plate. In the case of the end-frames the tie-beams are doubled, one over and the other under the top-plates, which are thus clasped. This instance, if acceptable, would not only shed light upon the probable time of initial advocation of the dovetail tie-beam method; but would also indicate the commencement of the period of popularity enjoyed by the ubiquitous East-Anglian collar-purlin roof, since these dovetailless tie-beams show no king-post matrixes, nor any evidence of relationship to their original rafters.

It may thus be reasonable to assume that the bare-faced form of the dovetail was being tentatively used by roof-carpenters in the last quarter of the thirteenth century, and that the two entirely cross-halved barns last mentioned must pre-date this exploratory form by at least half a century; which makes them, provisionally, twelfth-century barns. And this, incidentally, is rather confirmed by comparing the scarf-joints of their plates with those of clearly later medieval barns.

Finally, some further evidence for there having been an exploratory period (in relation to the dovetail's advent) exists, in a striking manner, in the great Barley-barn at Cressing-Temple, Essex, which past authorities have agreed cannot be later than AD 1480—a very conservative limit! The braces between the tie-beams and their posts are straight and are tied at the points of their upper and lower thirds, to the tie-beams and top-plates respectively; this evinces a conviction on the part of the designer that they would tend to flex into an arc, under pressure. This was entirely reasonable and in view of the designer's awareness of this tendency he used upon the ends of these ties those joints which he believed would most efficiently resist longitudinal withdrawal—*notched squint-laps!* This seems to indicate a period, probably prior to AD 1300, during which carpenters still believed some of the joint-forms peculiar to the eleventh, twelfth and early thirteenth-centuries to possess advantages over the then known dovetail-form, when employed upon acute angles.

Cecil A. Hewett



3, an end-post of the Barley-barn, Cressing-Temple, showing the tie-pieces applied to the tie-beam brace. These are notched laps—a Renaissance carpenter would probably have used dovetails at these points.

SKILL

STRUCTURAL DEVELOPMENTS IN BRITAIN TODAY

On the occasion of the congress in London of the International Union of Architects, the theme of which is the impact on architecture of new materials and techniques, Alan Harris, **B.Sc.(Eng.), M.I.C.E, M.I.Struct.E.,** *reviews on the following pages the recent history of structural engineering in Britain. He considers that the achievement of British structural engineers lies less in large scale* tours de force *than in adapting the techniques employed for these to the mass production of components needed for schools, factories and, indeed, the ordinary run of civil building. This is a tradition going back well into last century—see the introduction to the retrospective feature on pioneer structures—also related to the IUA congress—on pages* 14-19.

If Civil Engineering may rightly be regarded as a French invention of the seventeenth and eighteenth centuries, it received an independent birth in England at the end of the eighteenth century under totally different conditions. One was launched by the servants of the King, the other by ambitious craftsmen; one had every sign of Royal favour, the other bore the stigma of common men on the make; one was supported by generations of brilliant mathematicians, the other relied on direct intuition and the craftsman's feel. These were the two great sources of modern civil engineering. The streams have often mingled and separated again and their identity can still be traced. They draw together when each is at its best; at their worst one is an abstraction devoid of reality, the other is that form of blinkered complacency which goes with men whose pride it is to be 'practical.'

The general picture

Many of the pioneering works of nineteenth-century British engineering in cast iron, wrought iron and steel are with us still and are referred to on pages 14-19. Among them were a number of perfectly sound structures built of reinforced concrete in the sixties and seventies in accordance with Wilkinson's patents, though it was not until the French invasion at the turn of the century that the use of this new material became widespread.

The twentieth century has not seen advances in structural engineering in any way comparable to those in other fields of engineering; it has been marked in Britain rather by the steady popularization of construction and design so that structural forms which were once reserved for the major building and entrusted to the hands of only a master of the art, are now legislated for in building regulations and can be effectively employed by the junior engineer.

Indeed, few new structural forms have been developed anywhere; progress has been rather in the improvement of materials and means of erection, in refinements of analysis and in a perpetual renewal and adaptation of classic forms to meet the needs of changing economic and functional requirements. The one novelty by way of structural form is, of course, the stressed skin or 'shell' structure. This form was not only new to structural engineering but indeed to engineering; even ships' hulls were previously conceived of as beam and slab structures. What is odd is that this form was first constructed in concrete, the most unlikely of sheet materials; the suspended or tensioned shell of timber or steel came much later. In these developments, British structural engineers have played their part; the local variations on the theme of Western engineering are examined below.

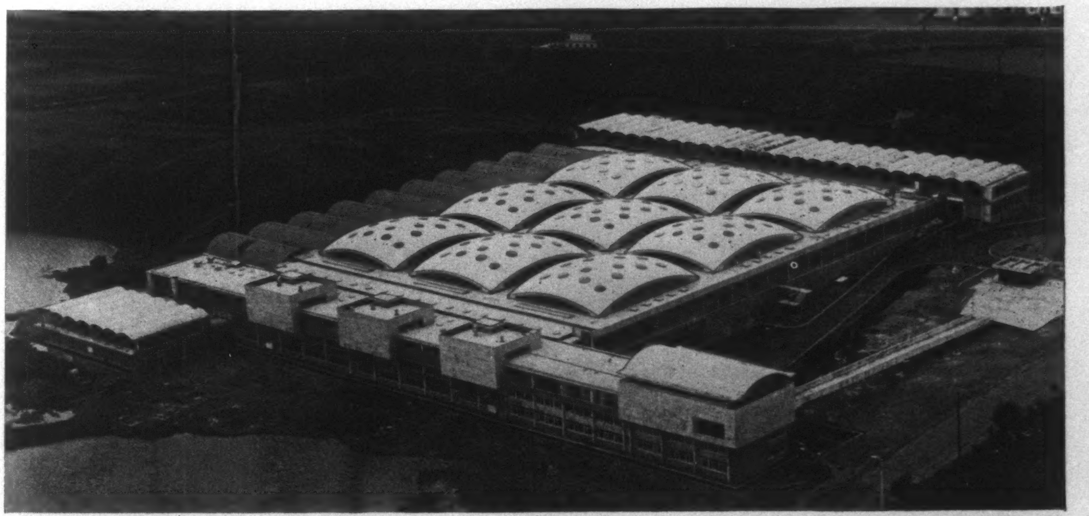
The professional background

The critical issue in Great Britain at the moment is the architect-engineer relation. During the nineteenth century, as we are well aware, the two diverged and lost touch—perhaps merely by force of defining themselves. The architects, appalled perhaps by the uglier aspects of the Industrial Revolution, withdrew into style and pastiche, left the drawing office for the studio and severed themselves from technical progress. The engineers, bewildered by modish aesthetic theory, lost all faith in the appearance of their works and thought it proper to hang them with imitations of the architectural style in vogue; perhaps they thought it was time they became gentlemen.

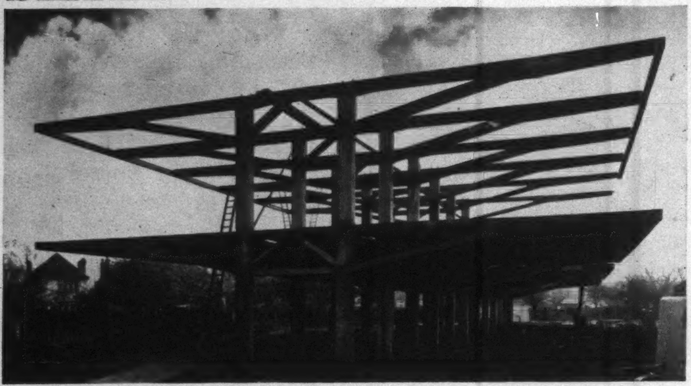
The gap was probably at its deepest in the first thirty years of this century. First steel and then reinforced concrete extended the size of building which could easily and cheaply be built, and for many years such buildings were either engineering structures with nostalgic decorative detail or were conceived in complete independence of structure and were passed out to engineers to prop up. The engineer and the architect thus became fixed in attitudes of hostility like a pair of china dogs.

This predicament is tragic. Since it is rare enough for the two even to meet, it is not surprising that the jargon of each has so diverged that communication is difficult. On one side of the gulf, the engineer finds himself confined in a journeyman world of costs and service accommodation; his triumph is to disappear from sight leaving the man on the other side of the gulf to deal with an internal and an external decoration almost entirely relieved of structural function.

This gap between purveyors of strength and purveyors of beauty has been bridged, albeit insecurely. In the 'thirties, the 'modern' movement (or whatever it should now be called) provoked the appearance



1, *factory at Bryn Mawr. Architects: Architects' Co-Partnership; engineer: Ove Arup. The high tide of the movement for the integration of architecture and engineering.*



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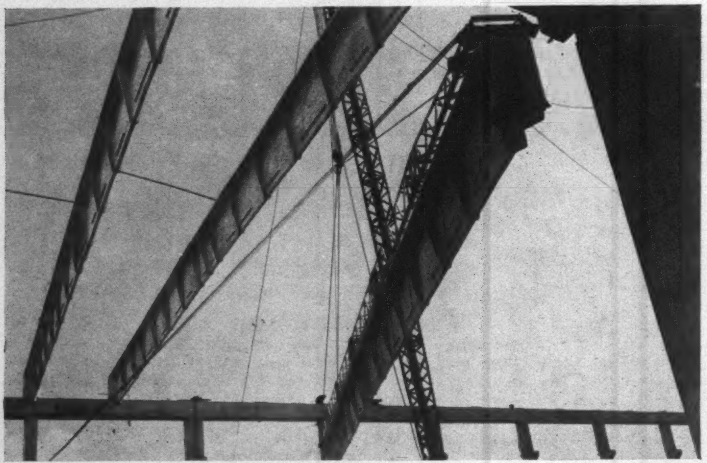
2, *Camden High School. Architects: Stillman and Eastwick-Field; engineers: F. J. Samuely and Partners. A school designed around a structural idea, the structure consisting of substantial identical concrete elements designed to be cast and prestressed off site.* 3, *workshop roofs, Harris Institute, Preston. Architects: Ministry of Education; engineers: A. J. and J. D. Harris. An example on a small scale of the integration of structure with functional needs:* 3 *in. thick prestressed concrete slabs on edge support roof and glazing to which latter they act as dazzle cut-offs.*



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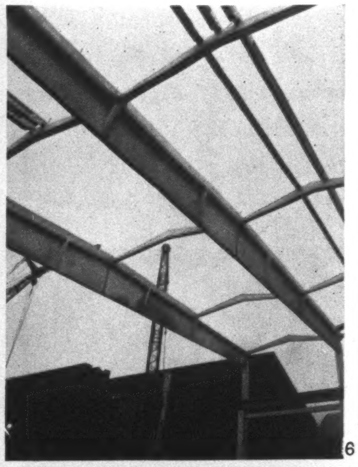

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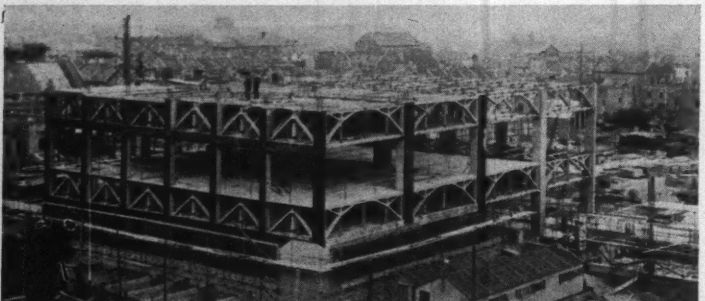

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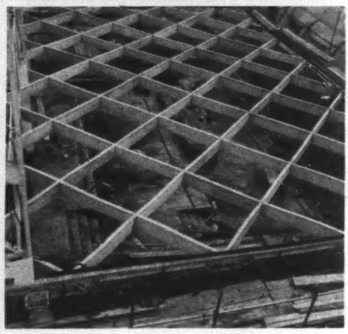

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4, 110 *ft. span secondary beams, BEA Hangars. Designers: Holland & Hannen and Cubitts and The Prestressed Concrete Company Limited. One of the first major works using segmental precasting in this country. A functional specification was issued by the authorities for competitive tenders.* 5, *factory at Malago, Bristol. Architect: E. F. Peat; engineers: F. J. Samuely and Partners. Very heavily loaded floors and very complex services; deep precast triangular prestressed concrete beams gave great strength and ample room for fitting and maintaining services in their depth.* 6, *Pilkington's factory, St. Helens. Architects: Fry, Drew, Drake and Lasdun; engineers: A. J. and J. D. Harris. A utilitarian prestressed concrete beam structure, precast off site.* 7, *Fairway Restaurant, Festival of Britain. Architects: Architects' Co-Partnership; engineers: Ove Arup and Partners. A prestressed concrete diagonal grid roof made of elements varying only in the location of the tendon duct.* 8, *Goods Depot, Liverpool. Architects: British Railways (Midland Region); engineers: A. J. and J. D. Harris. A functional structure erected very rapidly from precast elements assembled by prestressing. An example of the diversity of structural form which precasting makes possible.*

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of virtually a new sort of engineer in response to architects' new interest in, and demands of, structural engineering. The virtual creation of two men, Ove Arup and the late Felix Samuely, this new engineer made it his business to understand architectural problems and respond with sympathy to the architectural mind. The climate of this movement was clearly favourable to such rapprochement; if those who advanced under the banner of Functionalism sometimes confused the function of the building with function of the structure, the confusion usually emphasized the importance of structure.

Functionalism is seldom invoked nowadays; was it tried and found wanting or tried and found difficult? If Functionalism was not enough, was it even necessary? Can we forget its stimulus and, echoing another *ancien régime*, leave building to our servants?

The industrialization of building, proceeding apace, makes these very questions a trifle out of date.

The industrial background

Labour is short in Britain; it is difficult to get men to work on a scaffold exposed to the caprice of the climate when well paid jobs are available under cover in factories. But factory prefabrication gives better opportunities for controlling cost and quality: operations inconceivable on a site may be simple in a factory, and when the building programme is large, as it has been since the war, there are not enough traditional building craftsmen and labourers and prefabrication becomes a necessity.

At first grudgingly accepted and thus used in a manner which reeked of the 'lash-up,' prefabrication was later enthusiastically embraced by a few who saw that it was probably here to stay anyhow and that once its own discipline was accepted, it had great potentialities. The sort of prefabrication most practised is that referred to in some countries as 'light' prefabrication, whereby small elements are assembled on the site into larger ones, a process which preserves a great deal of flexibility. 'Massive' prefabrication is not much practised, since the capital investment requires a market which no one is prepared to guarantee; it is also very inflexible.

The step towards wholly integrated prefabrication has now been taken, notably by the Ministry of Education. An ambitious functional programme having been drawn up and a detailed and taxing price target set, architect, engineer and contractor together tackle the job. In many cases they have achieved a combination of flexibility in planning, functional adequacy, speed of erection and low cost which constitutes something of a triumph. Beauty, save for a minimum of attention to decorum, looks after herself; some say she seems not to suffer.

Structural design is carried out by consulting engineers and by the design staff of Government departments, municipalities and large corporations; it is carried out by suppliers of steelwork, reinforcing rods, concrete beams and timber structures; it is carried out by large building contractors; some architects have their own structural engineers. Now all these have different approaches and different interests; a design which suits a contractor because of some special plant which he has available will not suit a consulting engineer if obliged to take account of conditions of open tender.

[continued on page 65

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A design which is preferred by a firm which covers its design costs in the price of steel supplied may well differ from that of another which is paid on the basis of a percentage of the value of the work. The approach of a contractor putting in a competitive package deal will be different again.

This diversity has many attractions. As one result, British structural engineering is keenly cost-conscious; whilst wastefully expensive structures do get built, their expense rarely escapes remark. As another, it is permeable to new ideas; whilst a novelty may be repugnant to most it is usually attractive to some.

This permeability has been helped by the open nature of British structural engineering as a profession. Foreign engineers have always been able to make a living in Britain, and in this century there have been at least three mass invasions—by French concrete engineers at the beginning of the century, by Danish concrete engineers soon after and by German and Central European engineers in the thirties. Each of these brought a substantial contribution, which was accepted. Ove Arup and Felix Samuely were mentioned above—one came from Denmark and the other was born in Austria and trained in Germany.

Such diversity also has its disadvantages and perhaps one of the gravest is the impulse it has given to that fury of regulation which has seized the modern technical world. When engineering design was an hermetic mystery practised only by the initiate, regulations were unnecessary or self-imposed. Now that simple engineering knowledge is made accessible to all, the case for drafting elementary regulations to cover the elementary structural forms which constitute the vast bulk of architectural work becomes strong. A case can be made, for instance, for legislation defining design loads in common buildings, though in fact no decision is more delicate and more critical than that as to the load for which to design, a matter on which, when engaged on a major structure, an engineer will require to satisfy himself independently of official documents. But when legislation passes from the definition of loads to the regulation of design processes in detail, there is a danger that the popularization of design has been bought at the cost of development. Steel construction has been a special sufferer from regulation of this sort.

This popularization corresponds nevertheless to an ever-increasing use of new materials outside the competence of the traditional craftsman. The replacement of the timber beam first by the rolled steel joist, then by the reinforced concrete beam and later by prestressed concrete in all those branches of building corresponding to massive social needs—housing, schools, factories—has required a widespread knowledge of the new materials and an ability to design structures using them. The satisfaction of these social needs is the major function of the British structural engineer at present.

Now, in satisfying the social needs of a modern nation, the State will inevitably play a large role and will indeed be the client for a very substantial volume of work. It is necessary to say, therefore, that there is in Britain no body of official engineers, specially trained for State service and generally accorded authority on technical matters. The State and its various Ministries recruit their technical staff in the same market as any other employer,

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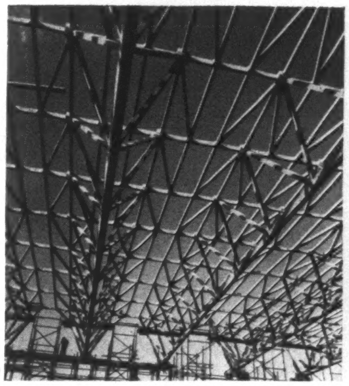

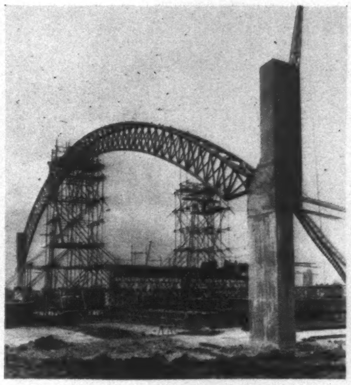

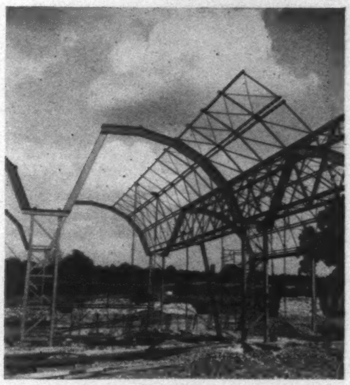

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9, hangars at Gatwick. Architects: Clive Pascall and Peter Watson; engineers: London Ferroconcrete and A. J. and J. D. Harris. A structure in prestressed concrete made possible by segmental precasting and the use of small prestressing tendons. It illustrates the new liberty of form towards which structural concrete is moving. 10, *hangars at Gaydon. Designers: John Laing and Son Limited and Ove Arup and Partners. A classic arch formed of welded steel tube.* 11, *Silentbloc Factory. Designers: F. J. Samuely and Partners. The use of light tubular steel supporting lightweight insulating material to do the same job as is done by a monolithic concrete shell.*

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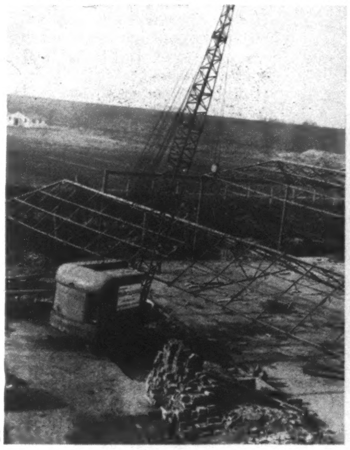

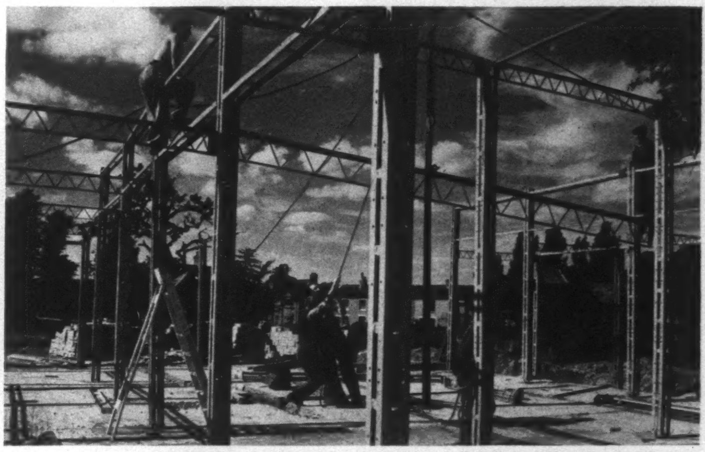

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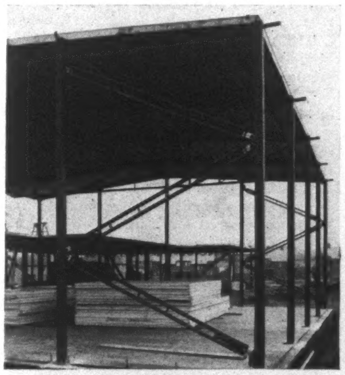
12, *workshop, Wigan. Designers: F. J. Samuely and Partners. A folded plate shell made of assemblies of tube and rod welded together, showing the simplicity and lightness thus obtained.* 13, *Leavesden Green School. Architect: County Architect, Hertfordshire; engineers: Hills (West Bromwich). A standardized structural frame using hot-rolled steel sections, showing the replacement of single rollings by built up components.* 14, *CLASP System. A standardized structural frame making extensive use of cold rolled steel sections. The bracing permits of settlement due to mining subsidence.* 15, *Intergrid. Designers: Gilbert Ash and The Prestressed Concrete Company Limited. The first prestressed concrete modular precast system for school construction. The beams shown were complemented by transverse segments lying between them and stressed to form a monolithic grillage.* 16, *Laingspan. Designers: John Laing and Son Limited and A. J. and J. D. Harris. A further MOE sponsored school system in prestressed concrete. Beams are simply supported and independent; wind loads are supported on braced columns. The structure has enough resilient flexibility to follow distortions due to mining subsidence. The external cladding follows the structural module but is otherwise free of major structural function.* 17, *garage at Lincoln. Designer: Hajnal Konyi. An exceedingly economic structure admirably suited to its function. The paraboloid shells were cast in-situ in reinforced concrete. The inexactitudes of simple paraboloid shell theory were revealed by model tests, which justified the detailing proposed by the designer.*



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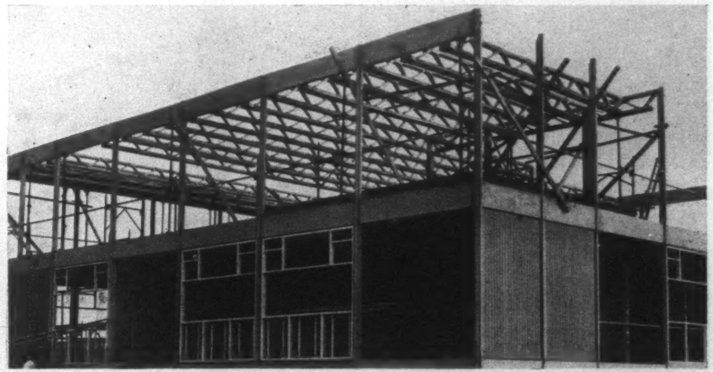

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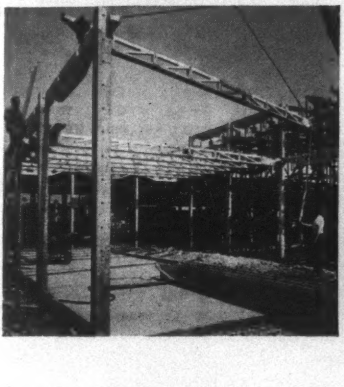

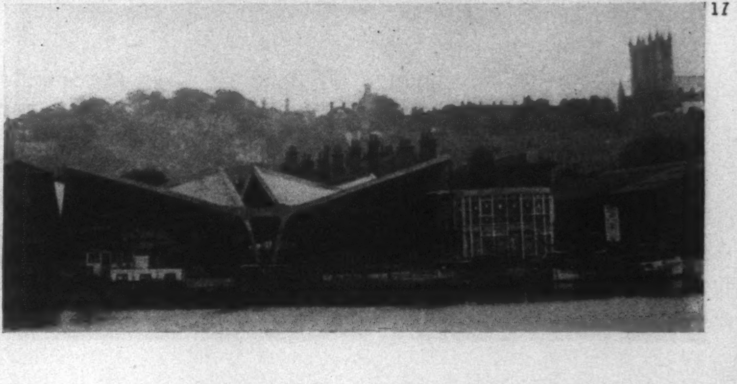

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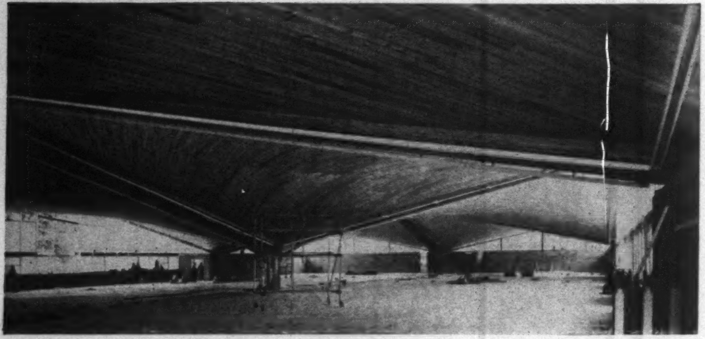

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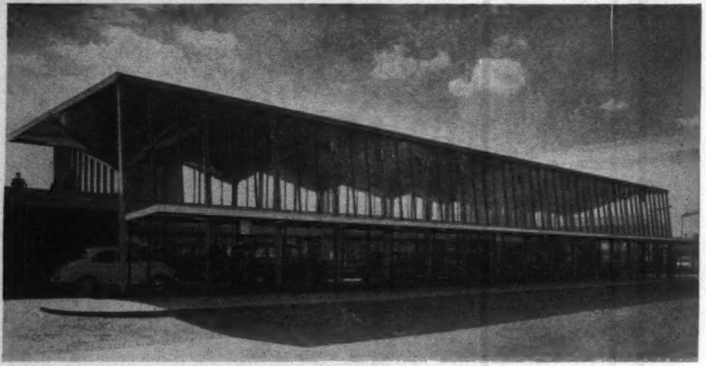

18, *factory at Market Drayton. Architects: Robert Townsend; engineers: Hume and Tottenham. A paraboloid shell made of timber.* 19, *booking hall, Crewe Station. Architects: British Railways (Midland Region); engineers: A. J. and J. D. Harris. A timber folded plate shell braced by a timber triangulated framework.* 20, *assembly hall roof, Perse School. Architects: Robert Matthew and Johnson Marshall; engineers: A. J. and J. D. Harris. A timber folded plate shell braced by a timber*

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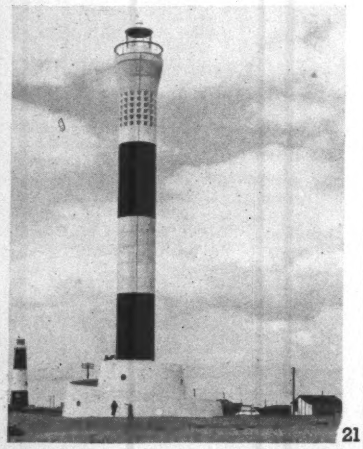

triangulated framework. 21, *Dungeness lighthouse. Architect: Ronald Ward. A precast prestressed concrete structure. The holes in the wall surround the foghorn.* 22, *Derby Racer, Blackpool. Architects: Howard V. Lobb and Partners; engineers: F. J. Samuely and Partners. A folded plate shell made of multiple layers of timber planks.*

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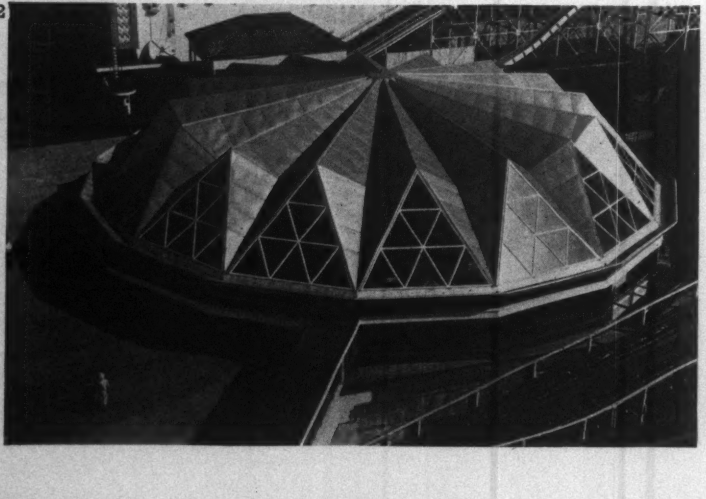

and State employment is in no way necessarily the mark of an élite. It is also a peculiarity of British public service that technical men are subordinate to administrators. Now in dealing with so large a volume of building it is clear that the administrators had an opportunity of deliberately stimulating design; where this opportunity has been taken, the results have been impressive.

British use of materials

Certain structural materials may be dismissed. Structural plastics, long heralded, are still on the verge of entering building from those specialized engineering uses for which they were developed. Aluminium played a notable role immediately after the war, when aircraft factories were set to work turning out large numbers of standard houses and schools at a very high rate—and cost. Since then the material seems not to have found any particular application where its advantages of freedom from corrosion and lightness outweigh its high initial cost.

To dismiss structural steel is obviously frivolous. It has been the basic material in Britain for the best part of a century—during most of which time it has been reliable, cheap and abundant. Until the last twenty years, the British structural engineer thought first in terms of steel; why is it, then, that there is so little originality in steel construction, so little striking design? Novelties there are of course; Prof. Baker and the Cambridge school launched the plastic theory of design in the thirties; cold-rolled sections, castellated beams, structural tubes both round and rectangular, broad-flange beams (the latter a British invention taken overseas by the inventor) have extended the scope of the designer. But all told, there seems to be no urge towards refinement of design or further development in structural steel. Perhaps we must blame the design regulations which were pitched, as we have seen, at a remarkably low level, doubtless as a result of aiming deliberately (and successfully) at a mass market too early. Steel continues to do a dull job in a dull manner, save only where a new impulse is applied, as in the mass-produced ultra-lightweight beams, seen at their best in the school systems.

The materials whose development is the most lively just now are concrete and timber, the former stimulated by the idea of prestressing, the latter by use of the new synthetic glues.

Prestressed concrete has had a huge success in Britain; some 40,000 tons of prestressing steel were used in 1960. Prestressed concrete arrived in England just before the war to find a country with an already extensive and highly developed precast concrete industry, and it has been very largely associated with precasting since, either in the form of complete elements, usually pretensioned, or of segments for post-tensioning on site. This latter form has opened unsuspected new horizons. A major attraction of reinforced concrete in its early days was its freedom of shape; as time went by, in Britain at any rate, it was found that complicated formwork was expensive, and concrete structures became depressingly rectangular and rectilinear in consequence. It is now seen that segmental precasting offers a flexibility in structural form which, while quite different in nature, is probably potentially far greater than that available to even the most expensive in situ construction.

In the early days of prestressed concrete, it was most used for substantial civil engineering works; the difficulty found in this country immediately after the war, with little civil engineering being undertaken, was to reduce the scale and to show an advantage in the use of prestressing in building works. Success rewarded this effort, and several stressing systems for single wires and strands were developed in this country. Here again, the Ministry of Education stimulated some notable structural designs, both in their 'systems' and in works carried out in more traditional ways.

One result of the spread of prestressing is that a building with vast surfaces of load-bearing concrete begins to look a little old-fashioned. Prestressed concrete is of high strength and is not cheap on a bulk basis; the tendency is thus towards slender load-bearing members with infillings either of other materials or of concrete facing panels with carefully prepared surfaces. The in situ concrete shell is becoming more infrequent, largely because other materials (notably steel and timber) in various combinations are found to be as good and rather cheaper—odd that the discovery took about 50 years to make. Very large span roofs, such as may justify concrete shell construction, are rare in this country.

Much research has been carried out in Britain this last ten years and is still going on apace; extensive fire tests have been made. The Cement and Concrete Association laboratories have played a leading part and are pioneering the use of scale models subject to loading and strain measurement as a design tool for the mathematically more intractable structures.

Concrete engineering has reacted to an idea; timber engineering has virtually been reborn by new means of assembly, notably synthetic resins. Timber in its classic form has always suffered from the uncertainty and clumsiness of tension joints; this difficulty no longer exists, and new forms of beams and trusses and arch ribs, laminated and built up, are being erected. Most notable of all, however, are the timber shells, variously cylindrical, conoid and paraboloid, which have been developed with the help of the Timber Development Association; they are built in a manner reminiscent of the wartime Mosquito air-frame. A great deal of work has to be done and prejudice overcome before timber is used widely in any but a minor structural role; the supply of stress-graded timber would help a lot. The low value of Young's modulus may well set an upper limit to the size of timber structures, but in the meantime timber is being used in a most lively fashion.

Conclusion

Structural engineering in Britain is a public necessity; its main function is to satisfy public needs at a minimum expenditure of human effort; put more bluntly, at minimum cost.

The effort to define these needs, and to satisfy them, and that at least cost, has a curious characteristic of exciting enthusiasm; structural engineering has its own share of that obscure but powerful creative force directed to bettering the material conditions of life, on which force the whole of our civilization relies. In acquitting themselves of their task, British structural engineers can adopt the austere boast with which Freyssinet summarized a lifetime of innovation: 'I have reduced the cost of certain forms of construction.'

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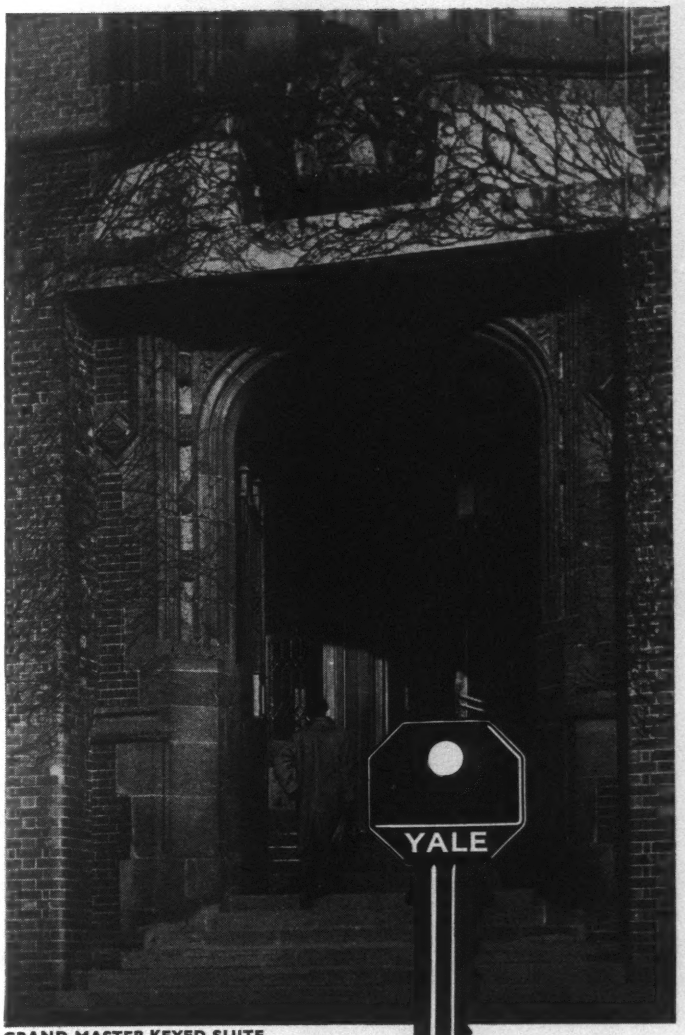

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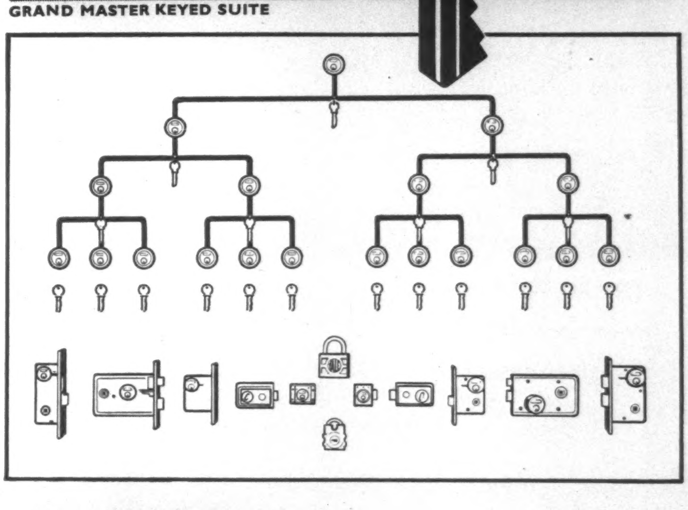

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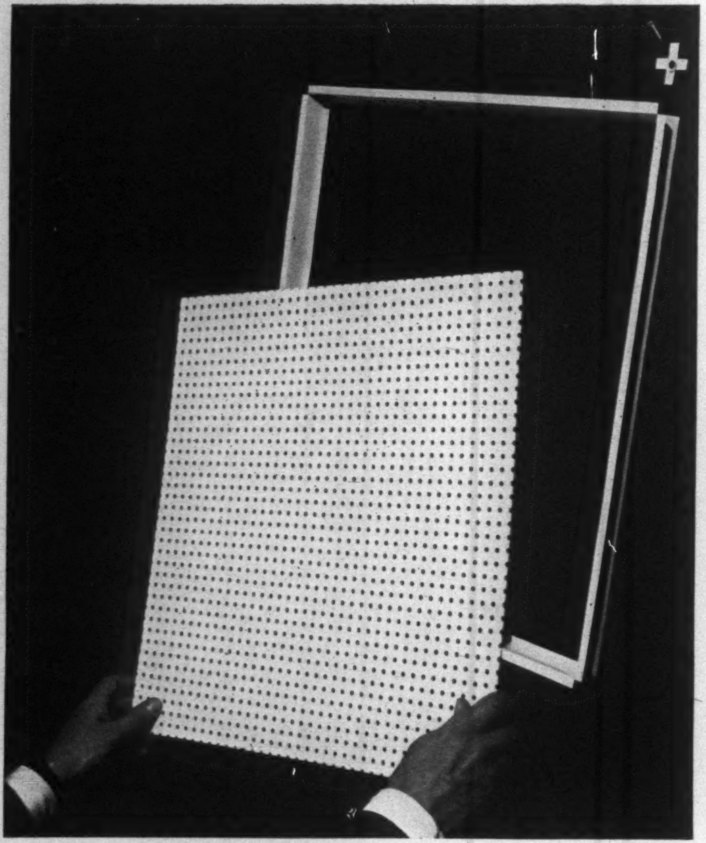

2, *the Bowater Versa-Tile ceiling panel.*

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above). The third kind is merely for decorative use and is the same as the thermal variety except that there is no mineral wool filling. The frames are available in two sizes and in assessing the number of panels required the modular sizes should be used. (A rather neat point of detail is the ⅜ in. overlap of frame flanges which leaves a pronounced gap ⅜ in. wide and 1 in. deep between panels.)

1. Modular size 20 in. by 20 in., overall size 20⅜ in. by 20⅜ in. by 1 in. and 2. modular size 24 in. by 24 in. overall size 24⅜ in. by 24⅜ in. by 1 in.

A well-designed brochure (in line with Bowater standards) has been produced to describe the system and is illustrated with drawings and diagrams by Peter Matthews.

*Building Products Division, Bowater Sales Co., Ltd., Bowater House, Knightsbridge, London, S.W.*1.

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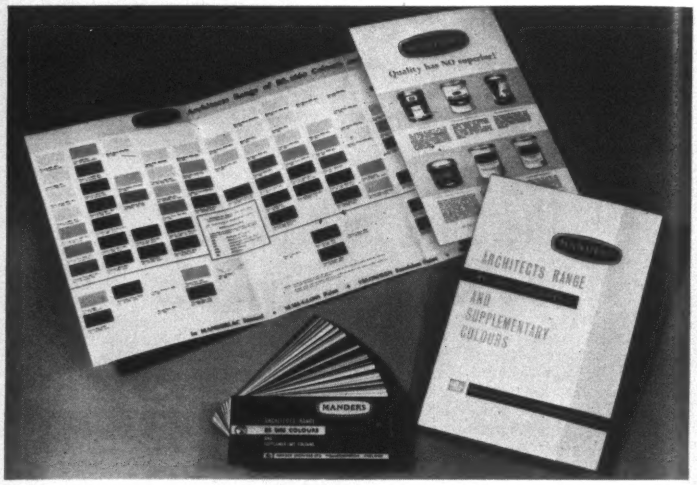
3, *Manders new colour card and range of colour samples.*



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colours. A neat colour card, 3, has been designed and its only failing (although an important one) is that the colour slips are too small. It seems that the manufacturers have taken the decision to have the whole range of colours visible at once (when the colour card is fully opened out) and to do this it has been necessary to sacrifice size or accept, as the only other alternative, a colour card the size of a drawing board. Admittedly a set of colour samples is also available (see photograph) but manufacturers should realize that, even if most architects are well organized, they are at least as prone to lose things as the next person and one large, complete brochure is better than two or three small ones.

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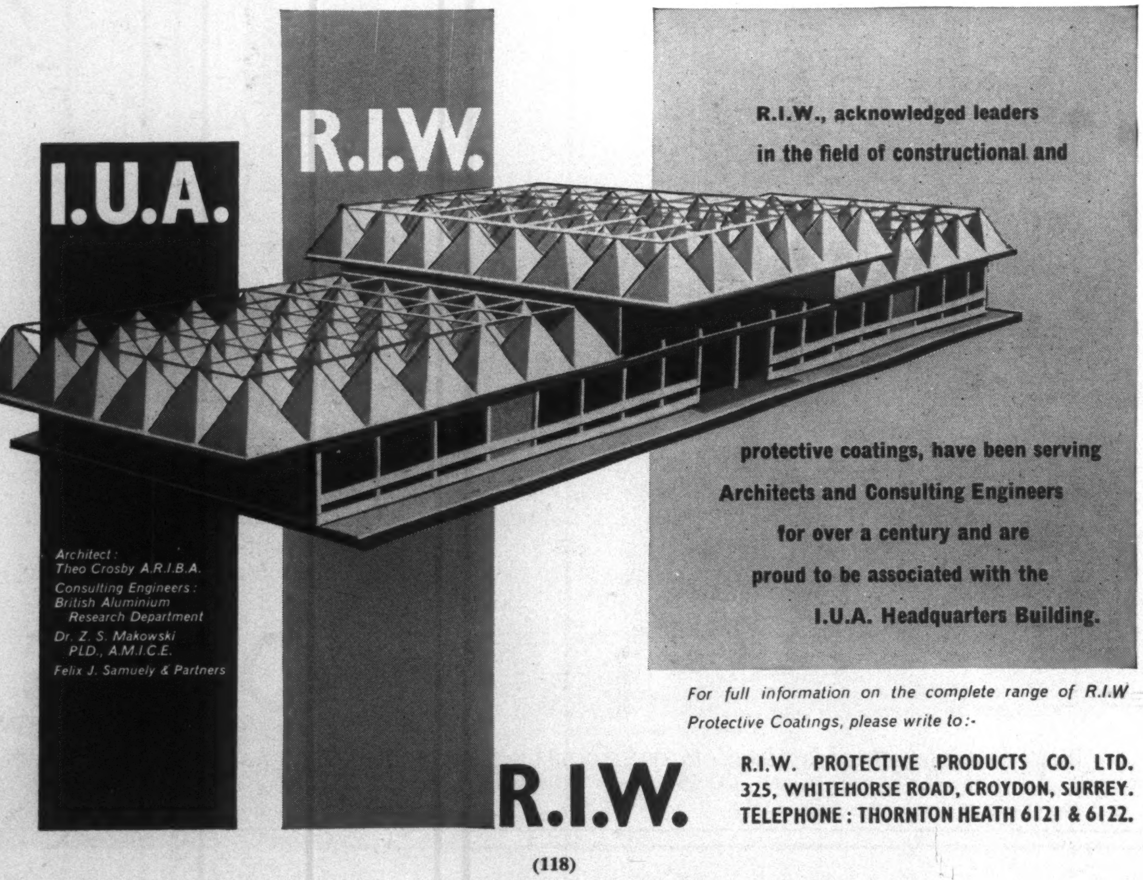

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